AIR TRAFFIC
BY THE NUMBERS

October 2021

Federal Aviation Administration

FAA Contributors to ATO By the Numbers

- **Air Traffic Organization (ATO)**
    - **AJR - System Operations**
        - **AJR-G Performance Analysis**
        - **AJR-B Flight Service**
    - **AJI - Safety and Technical Training Services**
        - **AJI-3 Policy and Performance**
    - **AJM – Program Management Organization**
        - **AJM-33 Aviation Weather & Aero Services**
    - **AJT – Air Traffic Services**
- **Non-ATO**
    - **AOC – Office of Communications**
    - **ABP-230 – Data Analysis and Reporting Services Branch**
    - **APO – Aviation Policy & Plans**
    - **AST – Office of Commercial Space Transportation**
    - **AVS – Aviation Safety**

Data Sources

Database Name	Owned/Managed by
Aviation System Performance Metrics (ASPM)	AJR-G
Operations Systems Network (OPSNET)	AJR-G (archive), AJM and AJW
National Traffic Management Log (NTML)	AJR-G (archive), AJM and AJW
Traffic Flight Management System (TFMS)	AJR-G (archive), AJM and AJW
National Offload Program (NOP)	AJR-G (archive) and AIT
U.S. Civil Airmen Statistics	APO
Runway Incursion Data	AVS
BTS T-100 Market and Segment Data	Bureau of Transportation Statistics

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Introduction

Air Traffic By the Numbers, or the *ATO Fact Book*, is a source book containing annual U.S. airport and air traffic control operations and performance data from the Federal Aviation Administration (FAA). It also includes information on air passenger travelers, runway incursions, commercial space launch activity, the economic impact of aviation, and so on.

The *Fact Book*, produced by the Office of Performance Analysis, Air Traffic Organization (ATO) of the FAA, is updated annually, with data now current up until FY2020. This document represents the fifth edition of *Air Traffic By the Numbers*; four previous editions appeared in August 2017, November 2018, June 2019, and August 2020.

The main storyline behind this year's *Fact Book* is the negative impact of the current COVID-19 pandemic on the volume of air traffic. This impact began in March 2020 and extended to the rest of the fiscal year and beyond. Obviously, this influence will reach into next year's FY2021 *Fact Book* numbers as well.

Organization of the *ATO Fact Book* is unchanged from last year. Section 1 includes some overall aviation-related statistics. NAS demand and efficiency measures appear in Section 2. New delay, diversion, go-around, and cancellation information follow in Section 3. Section 4 includes the latest data on various traffic management initiatives (TMI). Updated safety metric results are reported in Section 5. Other ATO Topics of interest are available in Section 6. In addition to the Core 30 airports, the newly introduced Appendix II includes several other airport lists used by FAA.

Impacts of the COVID-19 pandemic on air traffic were reflected in several measures. Among these were:

- Air traffic operations. Core 30 airport operations fell by 29.6 percent, to 9.3 million; operations handled by stand-alone TRACONS fell by 23 percent, while operations handled by centers fell by 26.6 percent (Section 2).
- Number of IFR flights. IFR flights in the U.S. fell by 25.3 percent, to 12.2 million (Section 1).
- Flights during peak operational times: At any giving minute during peak operational times, almost 5,400 flights were en route in U.S. airspace (Section 2). Usually, peak operational times occur during July. During FY2020, due to the pandemic, peak operational times happened in December 2019.
- Number of passengers. The number of passengers flown by air carriers decreased by 45.7 percent, to 0.6 billion (Section 1).

Further, at Core 30 airports, the pandemic also affected:

- Flight delays. Delays fell by 62 percent, to 114,760 (Section 3).
- Flight diversions. Diversions fell by 50.5 percent, to 9,534 (Section 3).
- Cancellations. Cancellations increased by 96.5 percent, to 208,759 (Section 3).
- Runway incursions. Incursions fell by 40.3 percent, to 233 (Section 5).

Work on this publication benefited from the contributions from many offices and individuals throughout the Air Traffic Organization and the Federal Aviation Administration. We thank everyone who participated in this effort.

System Events and Analysis Group (AJR-G3)
Office of Performance Analysis
System Operations Services
Air Traffic Organization
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U.S. Department of Transportation

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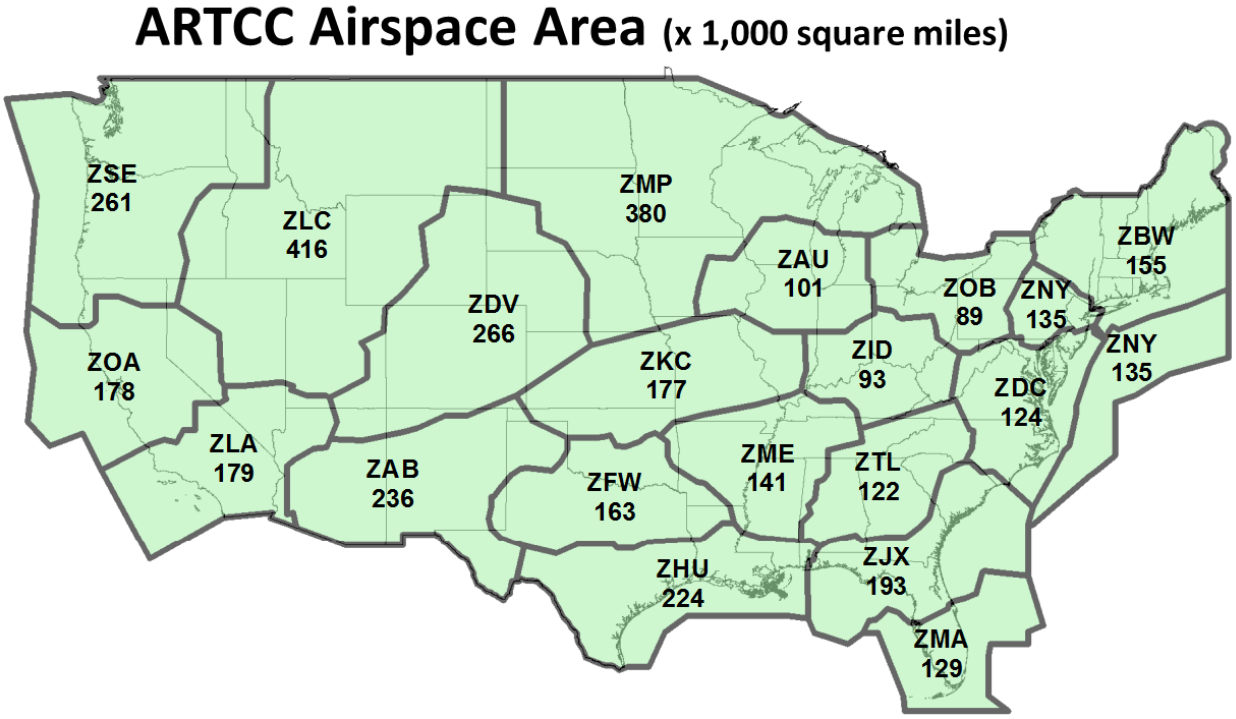
Air Traffic Organization Leadership

www.faa.gov/about/office_org/headquarters_offices/ato/leadership



Section 1. FAA Air Traffic Management System Overview for FY2020

ATO Program and Financing Operations Budget Estimate (in $billions) (FY2020)	**$8.0**
Flights Handled	**12,246,352**
Scheduled	7,431,105
Unscheduled	4,815,247
Airspace (in millions of sq mi)	**29.4**
Oceanic	24.1
Domestic	5.3
Airports	**19,773**
Public Airports	5,082
Private Airports	14,691
Federal Air Traffic Control Facilities	**313**
Stand-Alone ATC Tower Facilities	139
Stand-Alone TRACON Facilities	25
Combined ATC Tower/TRACON Facilities*	124
Centers and Combined Control Facilities	25
ARTCC	21
CCFs	4
Contract Air Traffic Control Towers**	**258**
NAVAIDS	**12,989**
Alaska Weather Cameras	**235**
Controllers	**14,153**
GA Aircraft (CY2019)	**211,000**
Fixed Wing	166,500
Rotorcraft	10,200
Experimental/Lightcraft/Other	34,300
GA Flight Hours (CY2019)	**25,566,000**

*Combined ATC Towers and TRACONs are located within the same building.
**Includes two new contract towers introduced during FY2021.

Sources:

ATO Program and Financing: U.S. Dept. of Transportation, Budget Estimates: FY2021, Federal Aviation Administration, p. 2.

Flights Handled: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), February 23, 2021; Innovata, Flight Schedule Database, accessed April 13, 2021.

Airspace: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G).

Airports and **NAVAIDS**: Federal Aviation Administration, Air Traffic Organization, Airport Safety, Airport Data and Contact Information, November 8, 2019. https://www.faa.gov/airports/airport_safety/airportdata_5010/; Federal Aviation Administration, Air Traffic Organization, Technical Operations (AJW), Facility Service and Equipment Profile, November 17, 2020. https://employees.faa.gov/org/linebusiness/ato/operations/technical_operations/ajw1/ajw1B/fsep/

ATC Towers, TRACONs, and **En Route Centers & CCFs**: Federal Aviation Administration, Air Traffic Organization, Air Traffic Services (AJT).

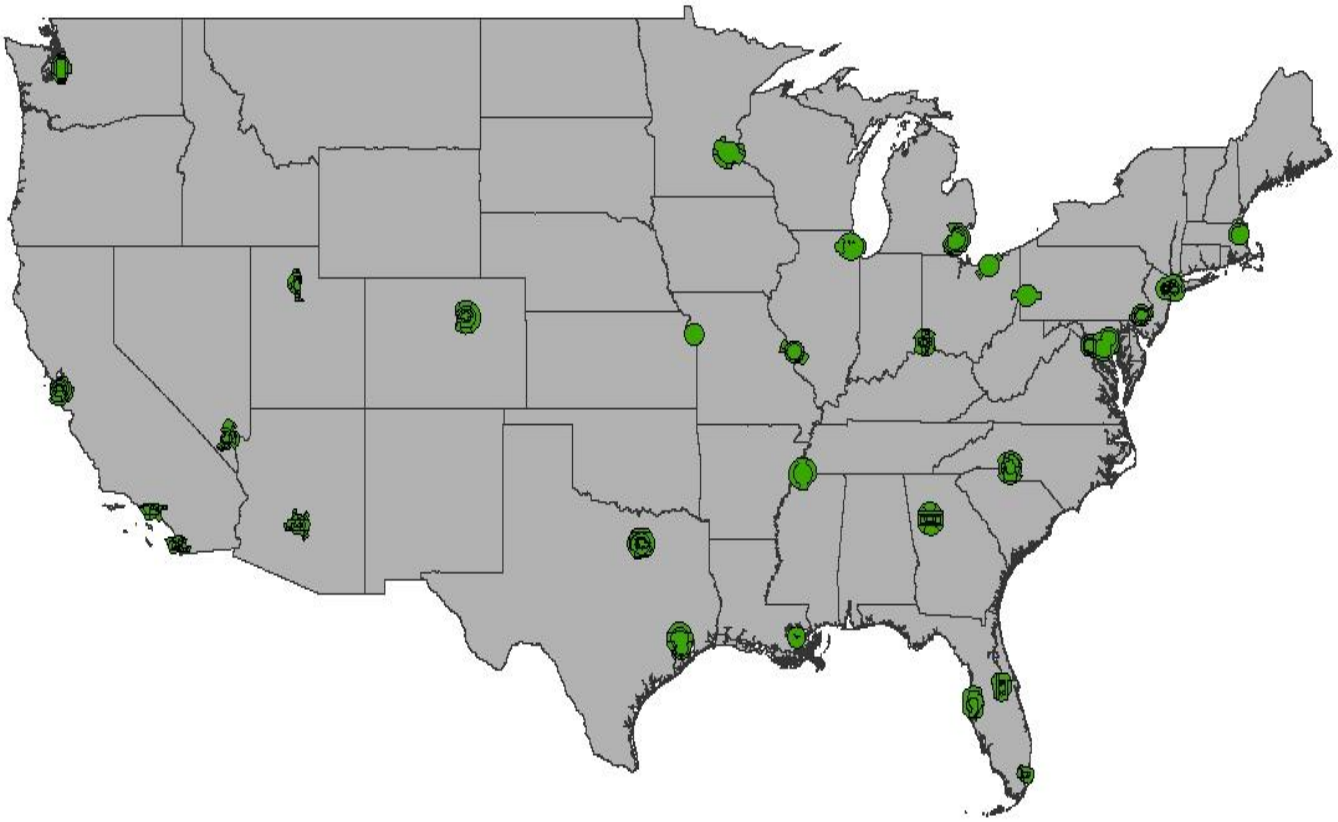
Alaska Weather Cameras: Federal Aviation Administration, Air Traffic Organization, Aviation Weather & Aeronautical Services (AJM-33), FAA Aviation Weather Cameras, accessed November 20, 2020. https://avcams.faa.gov/sitelist.php

Controllers: Federal Aviation Administration, Office of Finance and Management, Data Analysis and Reporting Services Branch (ABP-230), Air Traffic Controller and Academy Movement Report - September FY2020, November 17, 2020.

GA Aircraft and **GA Flight Hours**: Federal Aviation Administration, Aviation Safety (AVS), General Aviation and Part 135 Activity Surveys – CY2019, Tables 1.1 and 1.3, December 4, 2020. https://www.faa.gov/data_research/aviation_data_statistics/general_aviation/

Class B Airspaces (Airspace around Busiest US Airports)

Note: Airspaces accurately represented for coverage area

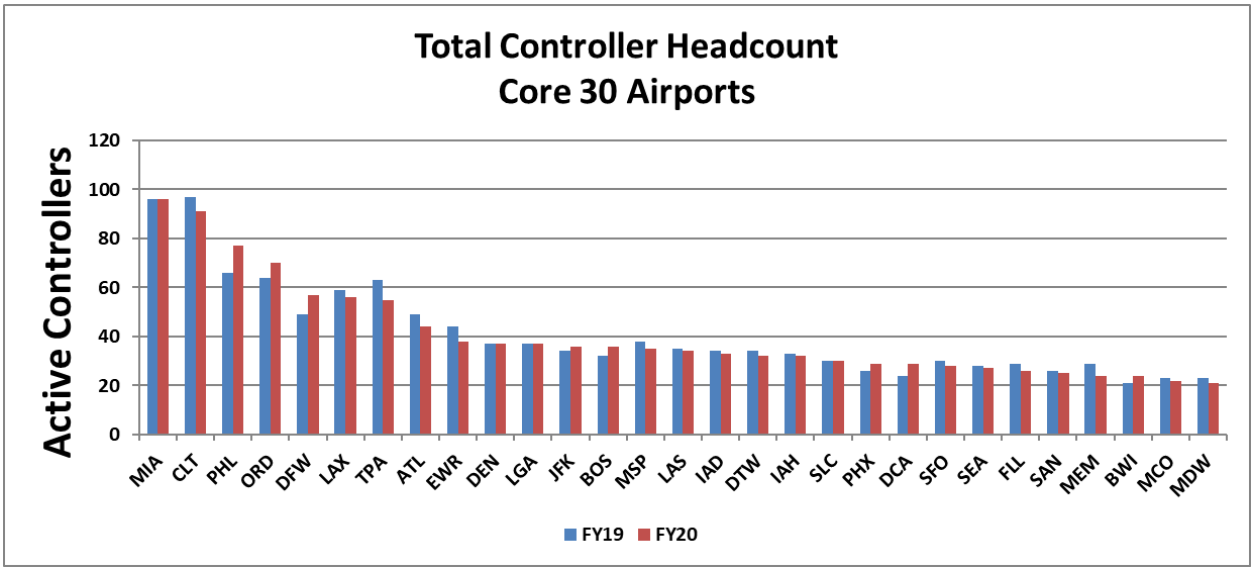


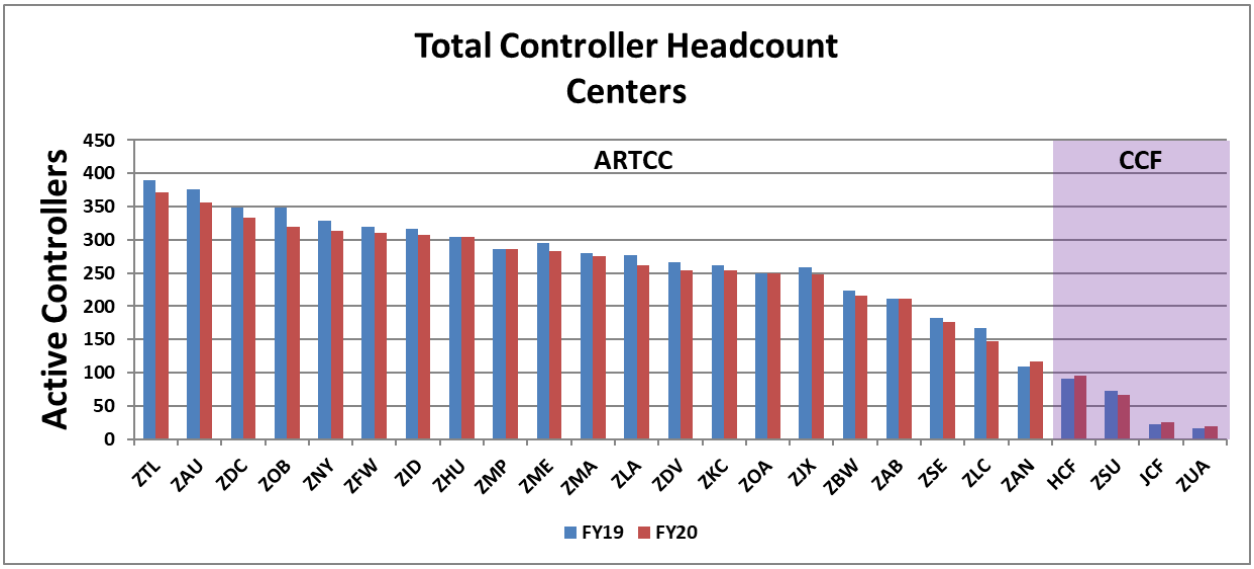
Air Traffic Controllers

As of the end of FY2020, the FAA air traffic controller total was 14,153, a decrease from 14,375 at the end of FY2019.

	FY2019	FY2020
Academy Graduate (AG)	882	904
Developmental (D1)	223	205
Developmental (D2)	691	644
Developmental (D3)	564	500
Certified Professional (CPC)	10,419	10,234
Certified Professional in training (CPCIT)	1,414	1,310
Controllers	**14,193**	**13,797**
Academy	**182**	**356**
Total Headcount	**14,375**	**14,153**

The Core 30 airports Miami (MIA), Charlotte (CLT), and Philadelphia (PHL) reported large headcounts because these are combined ATCT TRACONs. PHL had the highest net gain of controllers at eleven, while TPA had the highest net loss at eight. (*See*, Appendix I for explanations of the Core 30 airport codes.)





Source: Federal Aviation Administration, Office of Finance and Management, Data Analysis and Reporting Services Branch (ABP-230), Air Traffic Controller and Academy Movement Report - September FY2020, October 15, 2020.

Pilot Certificates

The table below shows the number of pilot certificates held by age group (upper panel below) and by year (lower panel). The upper panel illustrates that student, commercial, and remote (or drone) pilots tend to be younger, while airline transport pilots tend to be older. The lower panel informs us that the number of total active pilot certificates held in the U.S. increased by 4.1 percent, from 664,563 in CY2019 to 691,689 in CY2020, mainly due to an increase in student pilot certificates from 197,665 to 222,629. Further, the number of remote pilot certifications (which began in August 2016) increased by 28.7 percent, from 160,302 in 2019 to 206,322 in 2020. (Note, the pilot total does not include flight instructors and remote pilots.)

Estimated Active Pilot Certificates Held by Category and Age Group of Holder, as of December 31, 2020

By Age Group	Type of Pilot Certificates							Certified Flight Instructor 2/	Remote Pilot 2/
	Total	Student	Sport	Recre-ational	Private 1/	Commercial 1/	Airline Transport 1/		
Total	**691,689**	**222,629**	**6,643**	**107**	**172,945**	**119,245**	**170,120**	**117,558**	**206,322**
14-15	561	561	0	0	0	0	0	0	0
16-19	23,288	17,601	17	0	5,299	371	0	115	2,421
20-24	72,979	39,659	88	5	18,069	14,109	1,049	6,386	13,755
25-29	84,166	45,173	160	9	14,051	18,625	6,148	10,448	25,523
30-34	71,896	34,746	255	6	13,159	12,779	10,951	12,042	29,666
35-39	65,123	24,157	308	3	12,841	10,478	17,336	13,824	28,846
40-44	56,103	17,272	307	4	11,972	7,990	18,558	12,345	24,080
45-49	49,029	10,880	386	5	10,872	6,710	20,176	11,249	20,924
50-54	55,326	9,912	552	8	13,271	7,478	24,105	11,557	18,713
55-59	59,746	8,610	837	6	16,461	8,197	25,635	10,494	15,993
60-64	56,318	6,208	1,056	23	18,541	8,411	22,079	9,161	12,201
65-69	41,732	3,963	1,051	17	17,030	8,166	11,505	7,864	8,124
70-74	28,758	2,395	829	13	11,652	7,243	6,626	6,266	4,120
75-79	16,537	1,042	485	6	6,313	5,023	3,668	3,627	1,466
80 & over	10,127	450	312	2	3,414	3,665	2,284	2,180	490

By Year									
2015	**590,038**	122,729	5,482	191	186,786	116,291	158,559	102,628	N/Ap
2016	**584,361**	128,501	5,889	178	174,517	112,056	163,220	104,382	20,362
2017	**609,306**	149,121	6,097	157	174,516	114,186	165,228	106,692	69,166
2018	**633,316**	167,804	6,246	147	175,771	115,776	167,572	108,564	106,321
2019	**664,563**	197,665	6,467	130	173,080	116,572	170,649	113,445	160,302
2020	**691,689**	222,629	6,643	107	172,945	119,245	170,120	117,558	206,322

1/ Includes pilots with an airplane and/or a helicopter and/or a glider and/or a gyroplane certificate. Pilots with multiple ratings are reported under highest rating. For example a pilot with a private helicopter and commercial airplane certificates are reported in the commercial category.

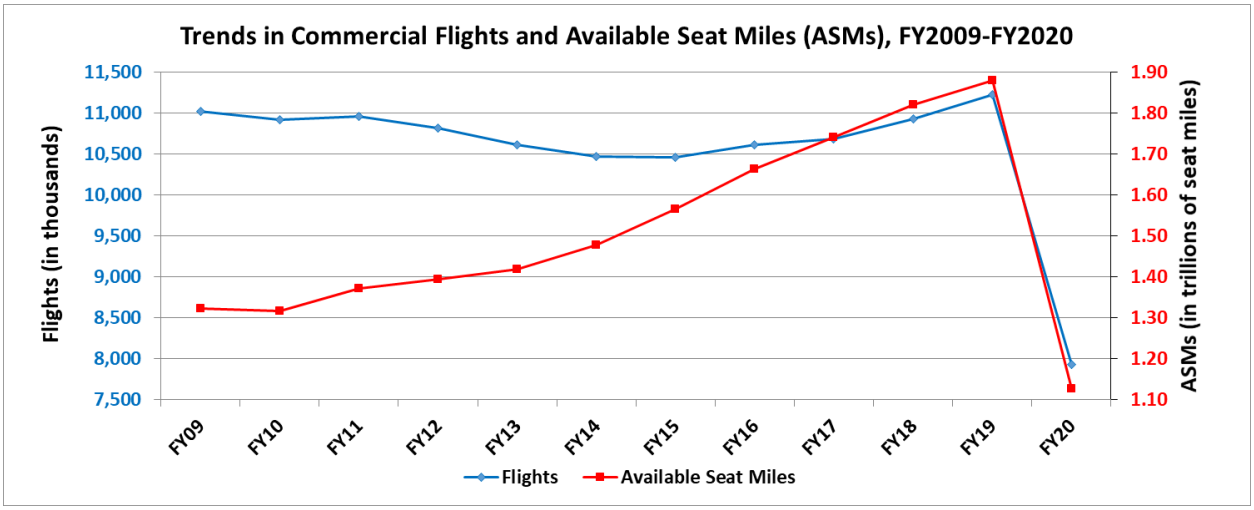
2/ Not included in total active pilots.

N/Ap Not applicable.

Source: Federal Aviation Administration, Office of Aviation Policy and Plans (APO), U.S. Civil Airmen Statistics, 2019, Table 12, May 15, 2020. https://www.faa.gov/data_research/aviation_data_statistics/civil_airmen_statistics/

Commercial Flight and Available Seat Mile (ASM) Trends

Due to the impact of the COVID-19 pandemic on air travel, data from the Bureau of Transportation Statistics show during FY2019-FY2020 the number of scheduled commercial flights fell by 29.3 percent to 7.9 million and the number of airline passengers fell by 45.7 percent to 574.4 million (the fewest number of passengers since FY1993). The numbers of revenue passenger miles (RPMs) and available seat miles (ASMs) fell by 50.3 and 40.1 percent, to 0.78 and 1.13 trillion, respectively. Load factor, the percentage of available seat miles flown by paying commercial passengers, fell from 83.4 to 69.2. Over FY2009-FY2019, the number of commercial flights rose by 1.8 percent to 11.2 million in FY2019 and the number of passengers rose by 33.3 percent to 1,058 million. During the same period, RPMs and ASMs rose by 50.8 and 42.3 percent, respectively. The table below shows passenger statistics for the two most recent fiscal years.



Source: U.S. Dept. of Transportation, Bureau of Transportation Statistics, T100 Segment Data, September 28, 2021.

Passenger Statistics		
	FY2019	**FY2020**
Yearly Passengers	1,057,645,399	574,409,405
Average Daily Passengers	2,897,659	1,569,425
Revenue Passenger Miles (trillions)	1.57	0.78
Available Seat Miles (trillions)	1.88	1.13
Passenger Load Factor (%)	83.4%	69.2%

Economic Impact of Civil Aviation		
	CY2015*	**CY2016***
Aviation in US generates # jobs	10,710,000	10,857,000
Earnings of (billions)	$481.90	$488.20
Aviation contributes annually (trillions)	$1.75	$1.77
Constitutes % of GDP	5.3%	5.2%

*Estimates for more recent years are not yet available.

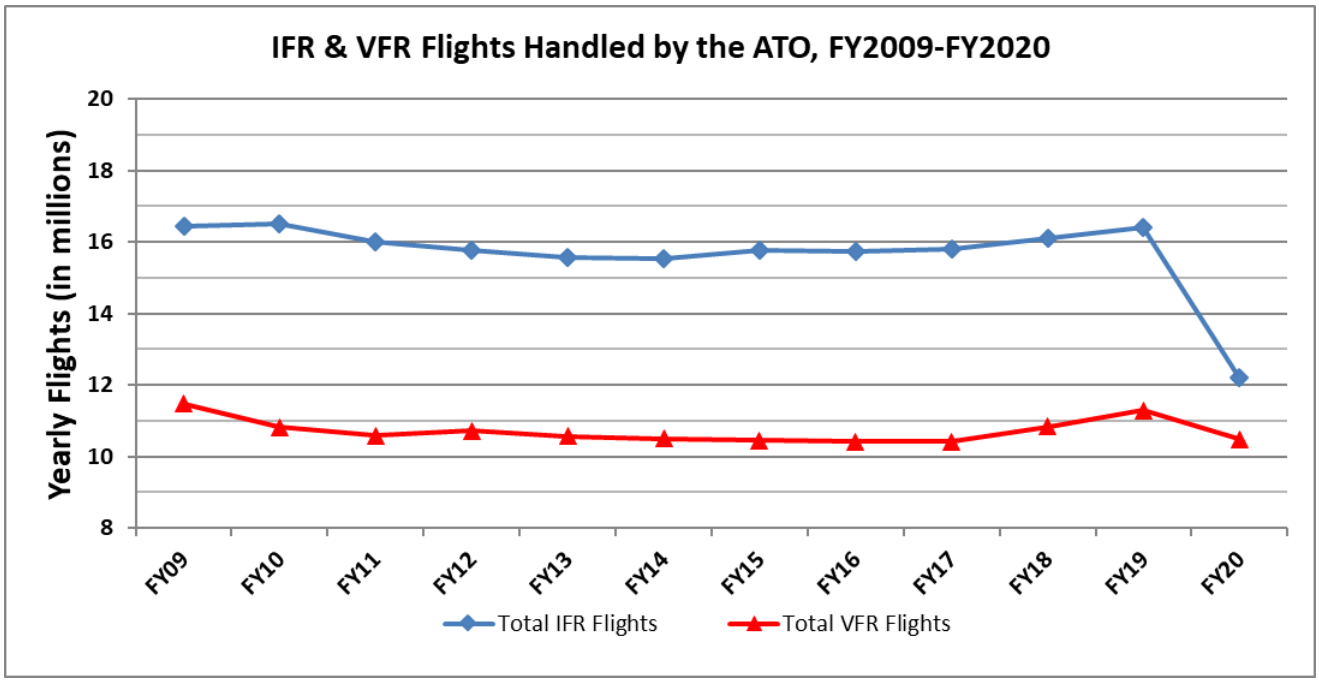
Sources:

Passenger Statistics: U.S. Dept. of Transportation, Bureau of Transportation Statistics, T100 Segment Data, September 28, 2021.

Economic Impact of Civil Aviation: Federal Aviation Administration, Office of Aviation Policy and Plans, Forecast and Performance Analysis Division (APO-100), Economic Impact of Civil Aviation on the U.S. Economy, January 2020. https://www.faa.gov/about/plans_reports/media/2020_jan_economic_ impact_ report.pdf

Instrument Flight Rule (IFR) and Visual Flight Rule (VFR) Flights across the NAS*

Office of Performance Analysis (AJR-G) data show the number of IFR flights fell by 25.3 percent to 12.2 million, and the number of VFR flights fell by 7.2 percent to 10.5 million in FY2020; both declines show the impacts of the COVID-19 pandemic on air travel during the latter part of the fiscal year, from March 2020 onward. The smaller percent decrease in the number of VFR flights is consistent with the greater ability of small aircraft pilots and passengers to socially distance themselves from other flyers.



*Note: OPSNET reports VFR activity as total operations (arrivals + departures). Total VFR flights are approximated by dividing total operations by 2.

Total numbers of fiscal year annual IFR and VFR flights also appear in the table below.

Year	IFR Flights	VFR Flights
FY2005	18,645,898	13,795,861
FY2006	18,066,360	13,378,426
FY2007	17,970,314	13,448,515
FY2008	17,908,487	12,812,585
FY2009	16,428,893	11,480,136
FY2010	16,522,406	10,815,975
FY2011	15,992,536	10,581,301
FY2012	15,760,241	10,714,777
FY2013	15,576,396	10,574,201
FY2014	15,546,452	10,506,576
FY2015	15,782,675	10,455,324
FY2016	15,724,478	10,416,280
FY2017	15,800,679	10,415,828
FY2018	16,122,488	10,843,622
FY2019	16,404,606	11,287,366
FY2020	12,246,352	10,476,996

Source: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), February 24, 2021 (for IFR), November 4, 2020 (VFR).

Section 2. Demand and Efficiency in the NAS

The NAS is composed of 521 airport towers (263 Federal and 258 contract towers), 149 terminal radar control (TRACON) facilities (25 stand-alone and 124 combined ATCT), and 25 control centers (21 air route traffic control centers (ARTCC) and 4 combined control facilities (CCF)).

TRACONs handle descending flights received from a center or ascending flights received from an ATC tower (see figure below). Of the 149 TRACONs in the NAS, 124 of them are combined such that the TRACON exists in the same location as the ATC tower. Such facilities include the Miami, Charlotte, and El Paso towers.

Centers handle all en route flights operating on Instrument Flight Rule (IFR) flight plans. Centers receive flights from or hand off flights to other centers throughout the flight's en route phase of operation. They also receive flights or hand off flights to TRACONs when flights enter or exit the en route phase of operation.

This report reveals the demand observed at some of the busiest facilities, represented by the Core 30 airport towers, the 25 stand-alone TRACONs, and all 25 centers (which include 4 CCFs). Efficiency is also reported based on the following metrics:

Number of Flights at Any Given Minute

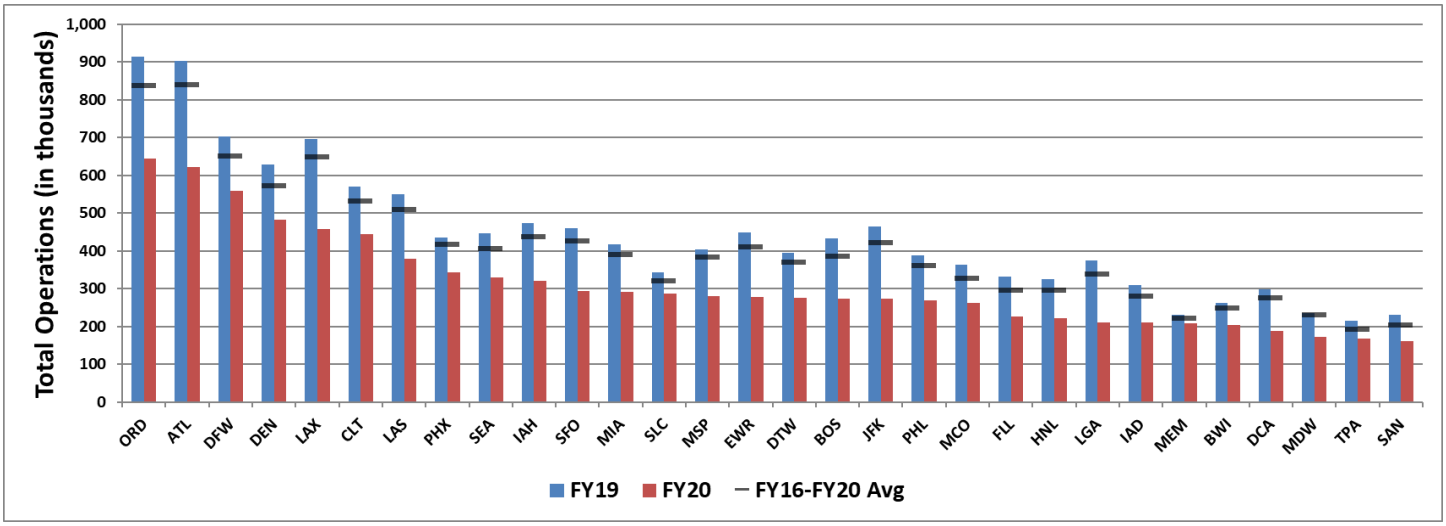
Average Hourly Capacity

Average Daily Capacity

Core 30 Airport Tower Operations

Airport operations are the sum of the number of airport arrivals and departures. Airport traffic controllers handle such operations. Each flight has a departure and arrival, meaning each flight has two airport operations. In FY2020, Core 30 airport operation numbers from OPSNET declined by 29.6 percent, from 13.2 in FY2019 to 9.3 million in FY2020, due to the impact of the COVID-19 pandemic. Across all 521 airport towers, operations fell by 16.6 percent, from 56.3 to 46.9 million.

Below are airport tower operations for each Core 30 airport for FY2019 and FY2020. In FY2020, Chicago O'Hare (ORD), Atlanta (ATL), and Dallas-Fort Worth (DFW) experienced the highest number of operations, however operations at each of these three airports fell by over 20 percent. (*See*, Appendix I for explanations of the Core 30 airport codes.)



Total Core 30 Airport Operations			
FY16-20 Avg	**FY19**	**FY20**	**%Change**
12,228,108	13,245,722	9,327,422	-29.6%

Airport	Rank*	FY16-20 Avg	FY19	FY20
ATL	**2**	839,529	903,135	621,012
BOS	**17**	384,967	432,722	273,560
BWI	**26**	247,486	261,338	203,297
CLT	**6**	532,068	570,751	443,933
DCA	**27**	276,432	297,843	188,757
DEN	**4**	571,491	629,315	483,345
DFW	**3**	651,682	703,157	559,315
DTW	**16**	370,244	394,907	275,412
EWR	**15**	409,318	448,622	278,420
FLL	**21**	295,868	331,201	225,470
HNL	**22**	294,755	324,579	222,451
IAD	**24**	281,013	309,147	209,638
IAH	**10**	437,927	474,155	320,900
JFK	**18**	421,518	465,003	273,181
LAS	**7**	508,217	549,098	377,933

Airport	Rank*	FY16-20 Avg	FY19	FY20
LAX	**5**	649,537	694,975	457,397
LGA	**23**	338,835	374,397	210,873
MCO	**20**	326,046	363,677	261,674
MDW	**28**	231,109	233,933	172,418
MEM	**25**	221,993	229,664	208,133
MIA	**12**	390,378	417,747	290,478
MSP	**14**	384,079	404,644	279,768
ORD	**1**	836,693	914,615	643,751
PHL	**19**	361,207	388,598	268,220
PHX	**8**	416,888	435,577	343,118
SAN	**30**	202,532	229,985	160,310
SEA	**9**	406,101	445,303	329,778
SFO	**11**	425,381	460,720	292,390
SLC	**13**	321,457	342,738	285,900
TPA	**29**	193,358	214,176	166,590

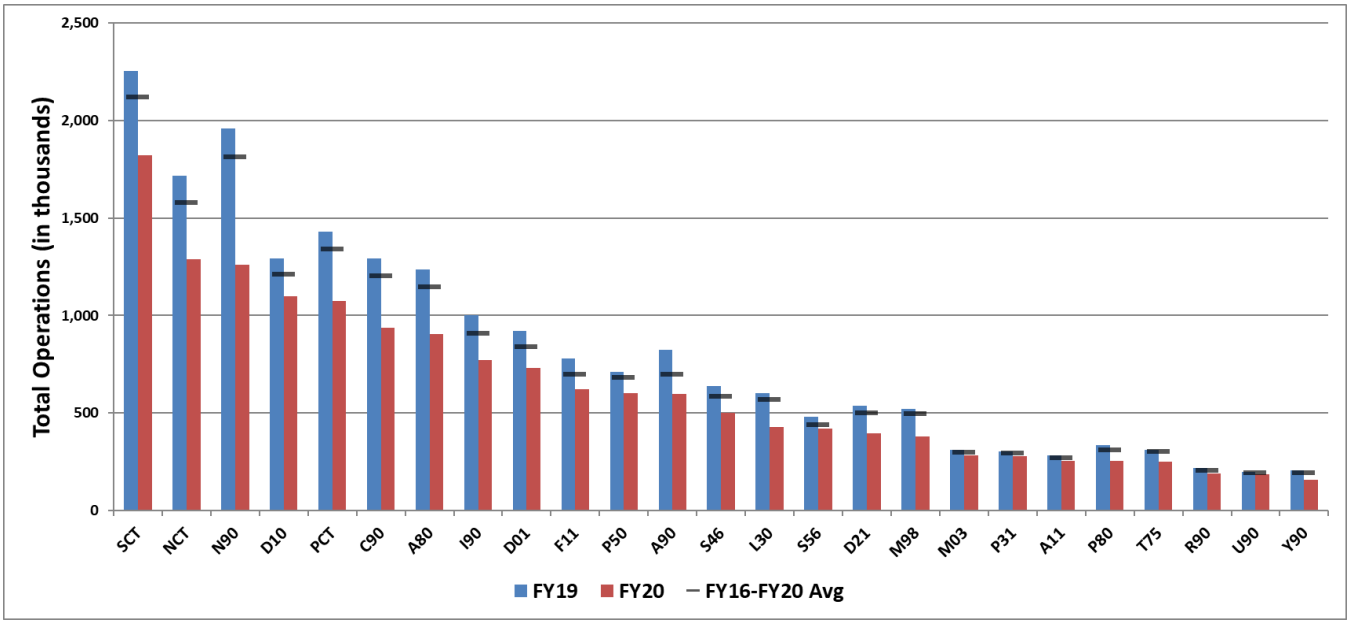
*Ranked by FY20 operations.

Source: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), Operations Network (OPSNET), November 24, 2020.

Stand-Alone Terminal Radar Control (TRACON) Facilities

TRACON operations are the count of IFR and VFR itinerant operations passed to and from area airports or centers, including overflights through TRACON airspace. In FY2020, among the 25 stand-alone TRACONs, operations fell by 23 percent, from 20.3 million in FY2019 to 15.7 million in FY2020. Across all 149 TRACONs, operations fell by 20.2 percent, from 39.2 to 31.3 million.

Below are operation counts for each of the 25 stand-alone TRACONs for FY2019 and FY2020. In FY2020, Southern California (SCT), Northern California (NCT), and New York (N90) had the highest number of operations, each with operations above 1.2 million. Operations at these three TRACONs fell. (*See*, Appendix I for explanations of the TRACON facility codes.)



Total Stand-Alone TRACON Operations			
FY16-20 Avg	**FY19**	**FY20**	**%Change**
18,979,068	20,343,525	15,671,413	-23.0%

TRACON	Rank*	FY16-20 Avg	FY19	FY20
A11	**20**	270,226	281,950	254,078
A80	**7**	1,148,112	1,236,695	902,906
A90	**12**	697,674	821,995	597,631
C90	**6**	1,204,370	1,291,157	935,168
D01	**9**	841,543	922,036	730,400
D10	**4**	1,210,790	1,294,512	1,097,424
D21	**16**	501,868	535,219	396,458
F11	**10**	697,385	778,136	623,047
I90	**8**	907,847	1,003,007	771,209
L30	**14**	567,949	600,761	426,421
M03	**18**	297,209	308,588	280,901
M98	**17**	496,265	520,529	377,139
N90	**3**	1,814,121	1,957,767	1,259,869

TRACON	Rank*	FY16-20 Avg	FY19	FY20
NCT	**2**	1,579,671	1,716,512	1,288,097
P31	**19**	294,441	301,111	279,704
P50	**11**	680,277	712,028	601,545
P80	**21**	310,814	335,485	252,141
PCT	**5**	1,340,615	1,428,613	1,073,967
R90	**23**	205,063	215,448	187,852
S46	**13**	584,852	636,714	500,178
S56	**15**	440,195	478,433	421,110
SCT	**1**	2,122,501	2,253,178	1,820,271
T75	**22**	302,987	312,376	251,047
U90	**24**	191,888	197,810	186,157
Y90	**25**	193,618	203,465	156,693

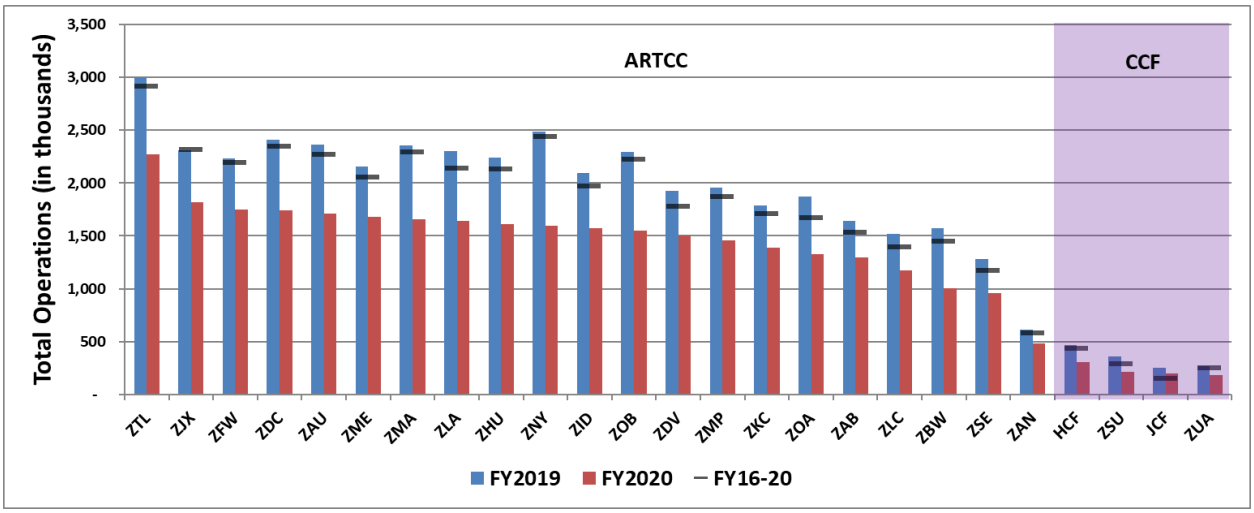
*Ranked by FY2020 operations.

Source: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), Operations Network (OPSNET), November 25, 2020.

Air Route Traffic Control Centers (ARTCC) and Combined Control Facilities (CCF)

ARTCC or en route operations are the count of IFR and VFR itinerant operations passing from a TRACON to a center, or from one center to another center, or from a center to a TRACON. It includes U.S. overflights and oceanic traffic through center air space that do not arrive at or depart from U.S. territory.

In FY2020, en route operation numbers for the 21 ARTCC and 4 CCFs fell by 26.6 percent, from 43.7 to 32.1 million. Below are operation counts by center for FY2019 and FY2020. In FY2020, Atlanta (ZTL), Jacksonville (ZJX), and Fort Worth (ZFW) reported the highest number of operations, each with more than 1.7 million. (*See*, Appendix I for explanations of the ARTCC and CCF codes.)



Total ARTCC & CCF Operations			
FY19-20 Avg	**FY19**	**FY20**	**%Change**
41,618,074	43,736,920	32,108,181	-26.6%

Center	Rank*	FY16-20 Avg	FY19	FY20
HCF	**22**	439,393	466,064	308,811
JCF	**24**	154,709	253,937	202,926
ZAB	**17**	1,537,179	1,639,182	1,293,774
ZAN	**21**	580,236	612,643	485,113
ZAU	**5**	2,274,009	2,363,935	1,708,664
ZBW	**19**	1,449,512	1,576,481	1,001,726
ZDC	**4**	2,346,310	2,412,375	1,739,401
ZDV	**13**	1,777,898	1,928,328	1,501,039
ZFW	**3**	2,191,140	2,230,886	1,753,078
ZHU	**9**	2,134,936	2,237,619	1,610,420
ZID	**11**	1,974,732	2,090,931	1,573,605
ZJX	**2**	2,314,169	2,307,573	1,820,539
ZKC	**15**	1,708,559	1,784,734	1,390,474

Center	Rank*	FY16-20 Avg	FY19	FY20
ZLA	**8**	2,144,152	2,299,082	1,643,612
ZLC	**18**	1,397,052	1,515,400	1,176,574
ZMA	**7**	2,295,621	2,356,251	1,658,655
ZME	**6**	2,053,999	2,154,585	1,681,424
ZMP	**14**	1,869,970	1,953,087	1,458,236
ZNY	**10**	2,438,874	2,488,341	1,595,944
ZOA	**16**	1,674,574	1,868,625	1,323,889
ZOB	**12**	2,221,426	2,294,035	1,550,757
ZSE	**20**	1,174,040	1,280,276	957,248
ZSU	**23**	295,099	356,585	217,431
ZTL	**1**	2,918,796	2,998,979	2,268,717
ZUA	**25**	251,687	266,986	186,124

*Ranked by FY2020 operations.

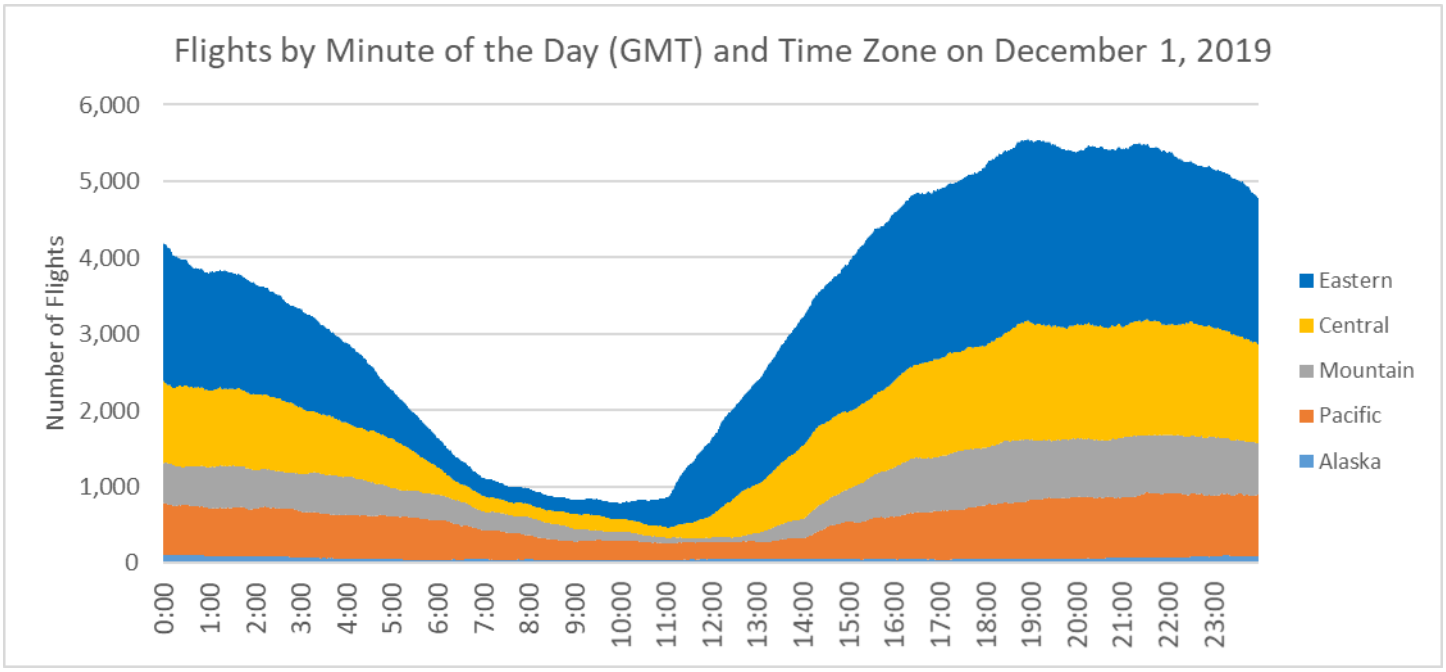
Source: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), Operations Network (OPSNET), November 25, 2020.

Number of IFR Flights at Any Given Minute during Peak Operational Times

5,000 Flights

Traffic flow management system (TFMS) flight data were used to determine the number of flights en route every minute of the day and by U.S. time zone on December 1, 2019, reflecting Sunday travel following the 2019 Thanksgiving Day holiday. Peak operational times in the NAS range between 1500 GMT and 2200 GMT. During peak operational times on that day, there were approximately **5,400** flights en route in the NAS every minute. (Peak daily flights usually occur in July during the summer travel season. However, due to the impact of the COVID-19 pandemic on air traffic during FY2020, the usual summer peak did not take place. Instead, the peak (or busiest day in the NAS) happened earlier during the fiscal year.)

The figure below shows the average number of flights en route per minute and flights under air traffic control by time zone. The Eastern Time zone has the largest share of flights in the NAS on average and, in this analysis, also includes flights under air traffic control from Puerto Rico and Bermuda. The Pacific Time Zone category includes all west coast air traffic as well as oceanic operations controlled by Oakland center (ZOA), including Hawaii and Guam.

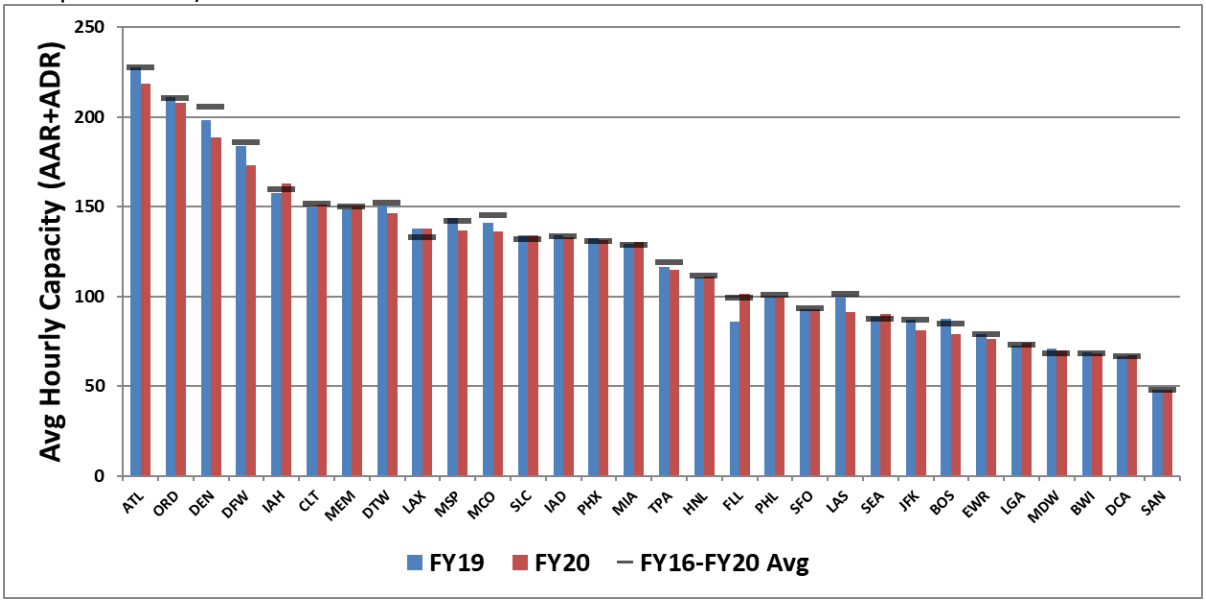


Source: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), July 23, 2021.

Average Hourly Capacity (Called Rate) at Core 30 Airports

In general, airport capacity is determined by its runways and surrounding airspace. For the purpose of this report, capacity is represented by an airport's called rates for reportable hours.

In FY2020, ASPM data for the Core 30 airports show that the highest average hourly called rates were at Atlanta (ATL) and Chicago O'Hare (ORD). Each had an average called rate of over 200 operations per hour. The highest increases occurred at Lauderdale (FLL) (up 17.9 percent) and Houston (IAH) (up 3.2 percent). (*See*, Appendix I for explanations of the Core 30 airport codes.)



AHC Across All Core 30 Airports			
FY16-20 Avg	FY19	FY20	%Change
3,681	3,652	3,602	-1.4%

Airport	Rank*	FY16-20 Avg	FY19	FY20
ATL	1	228	228	219
BOS	24	85	87	79
BWI	28	68	69	68
CLT	6	151	150	151
DCA	29	67	67	67
DEN	3	206	198	188
DFW	4	186	184	173
DTW	8	152	151	146
EWR	25	79	79	76
FLL	18	99	86	101
HNL	17	112	110	111
IAD	13	134	134	133
IAH	5	160	158	163
JFK	23	87	87	81
LAS	21	101	100	91

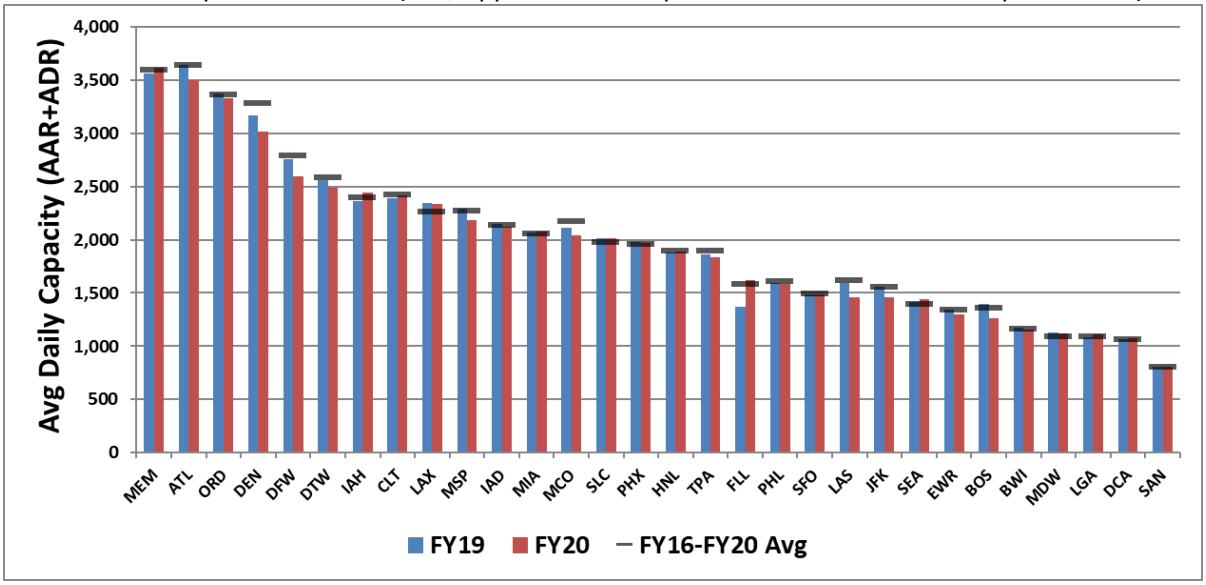
Airport	Rank*	FY16-20 Avg	FY19	FY20
LAX	9	133	138	138
LGA	26	73	73	74
MCO	11	145	141	136
MDW	27	68	71	70
MEM	7	150	148	151
MIA	15	129	129	130
MSP	10	142	143	137
ORD	2	210	211	208
PHL	19	101	100	99
PHX	14	131	132	132
SAN	30	48	48	48
SEA	22	87	88	90
SFO	20	94	93	93
SLC	12	132	134	134
TPA	16	119	117	115

*Ranked by FY2020 call rates.

Source: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), Aviation System Performance Metrics (ASPM), September 28, 2021.

Average Daily Capacity (ADC) - Based on Called Rates at Core 30 Airports

In general, airport capacity is determined by its runways and surrounding airspace. For the purposes of this report, capacity is represented by the airport's called rates for reportable hours. Average daily capacity (ADC) is the ATO's official tracking method for determining an airport's capacity during a day. In FY2020, ASPM data for the Core 30 airports show that the highest ADCs are found at Memphis (MEM), Atlanta (ATL), Chicago (ORD) and Denver (DEN); each with an average of over 3,000 operations per day. Note that ADC is larger for Memphis (MEM) than all other airports because all 24 hours are reportable there. (*See*, Appendix I for explanations of the Core 30 airport codes.)



ADC Across All Core 30 Airports			
FY16-20 Avg	FY19	FY20	%Change
59,937	59,559	58,777	-1.3%

Airport	Rank*	FY16-20 Avg	FY19	FY20
ATL	2	3,641	3,642	3,498
BOS	25	1,357	1,399	1,265
BWI	26	1,161	1,169	1,158
CLT	8	2,423	2,394	2,421
DCA	29	1,066	1,069	1,076
DEN	4	3,290	3,168	3,013
DFW	5	2,789	2,759	2,597
DTW	6	2,590	2,561	2,488
EWR	24	1,342	1,343	1,298
FLL	18	1,583	1,372	1,618
HNL	16	1,898	1,877	1,891
IAD	11	2,138	2,147	2,126
IAH	7	2,398	2,365	2,441
JFK	21	1,562	1,561	1,463
LAS	21	1,621	1,593	1,463

Airport	Rank*	FY16-20 Avg	FY19	FY20
LAX	9	2,262	2,345	2,338
LGA	28	1,097	1,088	1,108
MCO	13	2,175	2,114	2,040
MDW	27	1,093	1,132	1,118
MEM	1	3,596	3,560	3,619
MIA	12	2,057	2,065	2,081
MSP	10	2,272	2,295	2,188
ORD	3	3,365	3,372	3,328
PHL	19	1,615	1,597	1,584
PHX	15	1,961	1,983	1,973
SAN	30	810	810	810
SEA	23	1,398	1,414	1,440
SFO	20	1,497	1,487	1,484
SLC	14	1,978	2,013	2,013
TPA	17	1,903	1,865	1,837

*Ranked by FY2020 daily capacity.

Source: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), Aviation System Performance Metrics (ASPM), September 28, 2021.

Section 3. NAS Delay, Diversions, Go-Arounds, and Cancellations

Only flights departing from or arriving at their destination at least 15 minutes late are counted as a NAS system delay. The charts that appear below are based on OPSNET numbers, ATO's official source for delay data. Many factors contribute to delay, with weather is the most frequently cited reason. Delay imposes stress on the NAS, air traffic controllers, passengers, and the economy.

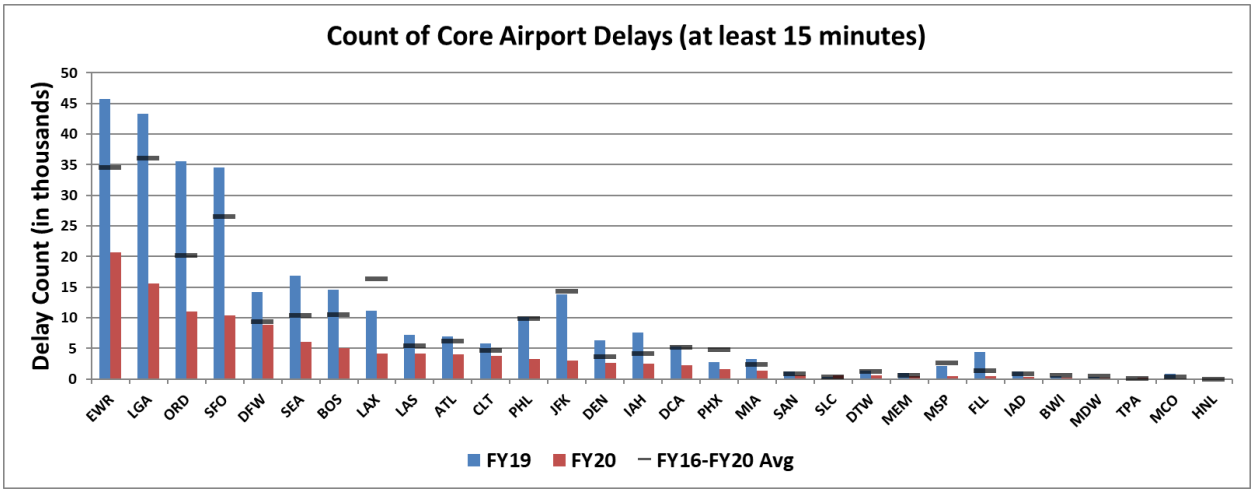
Diversions occur when a flight is routed to a different airport than its original destination. This usually occurs due to convective weather. Other less frequent reasons for diversions are medical emergencies, security, issues with the aircraft, or issues with passengers or crewmembers.

Go-Arounds occur when an aircraft is on approach to the runway but suddenly aborts the landing. This occurs if there is a sudden shift in the wind, an obstruction on the runway, or possibly, the aircraft inadvertently overshooting the runway. Go-arounds result in the aircraft returning to the landing queue to attempt another landing.

Cancellations can occur for numerous reasons due to weather, extensive delays in the system, equipment issues, etc. Air carriers cancel their own flights in response to these issues. Since the three-hour tarmac rule was imposed after 2010, more flights have been cancelled. This increase in cancellations means reductions in the number of recorded delays. During FY2020, the sudden decrease in the demand for air transportation due to the COVID-19 pandemic led to flight cancellations by airlines.

Counts of NAS Delay at Core 30 Airports

For FY2020, OPSNET data show that the number of Core 30 airport departure delays of at least 15 minutes decreased significantly, by 61.7 percent, mainly reflecting decreases in operations over the past year due to the impact of the COVID-19 pandemic. In FY2019 and FY2020, there were 299,244 and 114,760 delays, respectively. According to the graph and table below, in FY2020, delays were highest at Newark (EWR), LaGuardia (LGA), Chicago O'Hare (ORD), and San Francisco (SFO) each with over 10,000 or more delays. Together these four airports accounted for slightly over one-half of all Core 30 airport delays. (*See*, Appendix I for explanations of the Core 30 airport codes.)



Core 30 Total Delay Counts			
FY16-20 Avg	**FY19**	**FY20**	**%Change**
234,479	299,244	114,760	-61.7%

Airport	Rank*	FY16-20 Avg	FY19	FY20
ATL	**10**	6,245	6,978	4,041
BOS	**7**	10,565	14,629	5,036
BWI	**26**	574	497	193
CLT	**11**	4,729	5,819	3,730
DCA	**16**	5,131	5,252	2,268
DEN	**14**	3,690	6,390	2,640
DFW	**5**	9,319	14,219	8,854
DTW	**21**	1,293	1,378	599
EWR	**1**	34,577	45,718	20,681
FLL	**24**	1,400	4,366	526
HNL	**30**	27	15	2
IAD	**25**	890	1,257	400
IAH	**15**	4,230	7,620	2,473
JFK	**13**	14,388	13,847	2,972
LAS	**9**	5,446	7,280	4,118

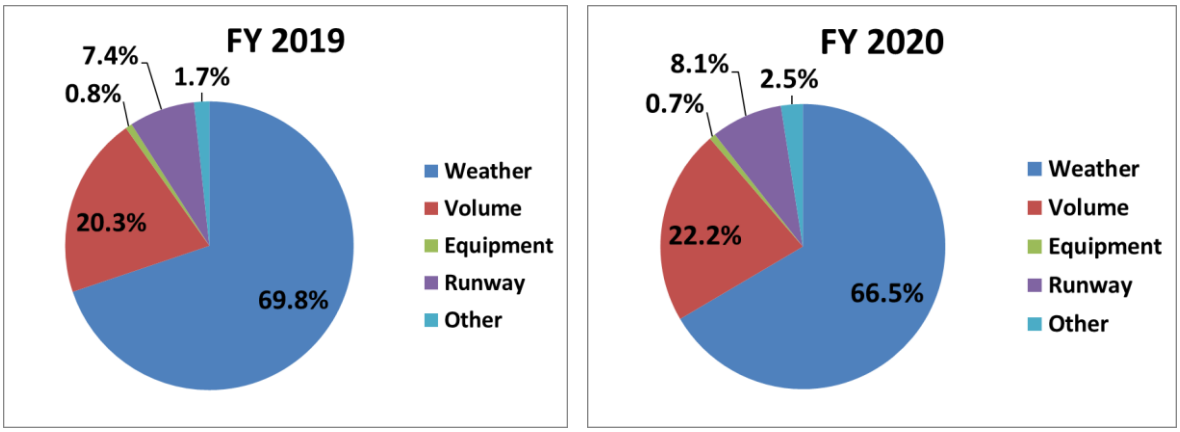
Airport	Rank*	FY16-20 Avg	FY19	FY20
LAX	**8**	16,331	11,215	4,192
LGA	**2**	36,074	43,352	15,619
MCO	**29**	310	897	109
MDW	**27**	429	383	188
MEM	**22**	664	948	529
MIA	**18**	2,433	3,222	1,373
MSP	**23**	2,693	2,157	527
ORD	**3**	20,167	35,625	10,970
PHL	**12**	9,898	10,193	3,221
PHX	**17**	4,766	2,798	1,646
SAN	**19**	817	1,248	625
SEA	**6**	10,420	16,839	6,060
SFO	**4**	26,574	34,586	10,387
SLC	**20**	302	404	612
TPA	**28**	99	112	169

*Ranked by number of FY2020 delays.

Source: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), Operations Network (OPSNET), October 4, 2021.

Delays by Category

The two charts below show the sources of delays at Core 30 airports by type of delay.



Note: System impact delays are delays assigned to causal facilities in OPSNET and are composed of delays due to TMIs, departure delays, and airborne delays. System impact delays are also the basis for delays by class and delays by cause in OPSNET. (http://aspmhelp.faa.gov/index.php/OPSNET_Reports:_Definitions_of_Variables)

Source: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), Operations Network (OPSNET), December 14, 2020.

Total Cost of Delay

The total cost of flight delays is the sum of costs to airlines, passengers, lost demand, and indirect costs. FAA Office of Aviation Policy and Plans (APO) estimates for 2019 show the cost of delayed flights rose by 9.3 percent, from $30.2 to $33.0 billion, an increase of $2.8 billion. Most of this rise was due to an increase in the impact of delays to passengers, from $16.4 to $18.1 billion, a $1.7 billion difference. Between 2012 and 2019, the total cost of delays rose from $19.2 to $33.0 billion, an increase of $13.8 billion. The cost of delays to passengers accounted for $8.4 billion of this increase.

$Billions	2012	2013	2014	2015	2016	2017	2018	2019*
Airlines[1]	5.7	6.0	5.8	5.8	5.6	6.4	7.7	8.3
Passengers[2]	9.7	11.0	10.5	13.3	13.3	14.8	16.4	18.1
Lost Demand[3]	1.3	1.4	1.4	1.8	1.8	2.0	2.2	2.4
Indirect[4]	2.5	2.7	2.6	3.1	3.0	3.4	3.9	4.2
Total	**19.2**	**21.1**	**20.3**	**24.0**	**23.7**	**26.6**	**30.2**	**33.0**

*Estimates for CY2020 are not yet available.

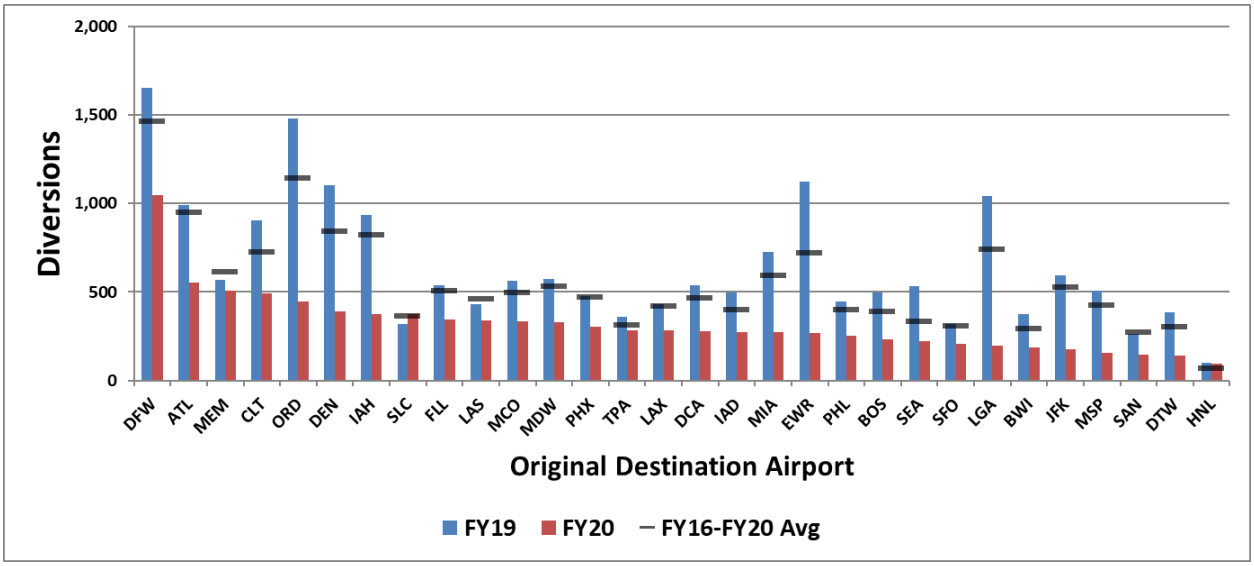
Notes:

1. **Airlines** (cost of delay to airlines): Increased expenses for crew, fuel, maintenance, etc.
2. **Passengers** (cost of delay to passengers): Time lost due to schedule buffer, delayed flights, flight cancellations, and missed connections.
3. **Lost Demand** (cost of passenger decisions to avoid future air travel): Estimated welfare loss incurred by passengers who avoid future air travel as the result of delays.
4. **Indirect** (indirect cost of delay): Other business sectors depend on air travel for transportation. Air travel delays impact these sectors by increasing costs in terms of dollars and time.

Source: Federal Aviation Administration, Office of Aviation Policy and Plans, Forecast and Performance Analysis Division (APO-100), July 8, 2020.

Diversions at Core 30 Airports

The airports reported below are the original intended destinations for the diverted aircraft. Increases in the number of diversions can indicate capacity issues at the airport due to weather, construction, or volume. Over all Core 30 airports, ASPM data show the number of diversions fell by 50.6 percent in FY2020. The number of diversions fell at every Core 30 airport, except at Salt Lake City (SLC), mainly reflecting decreases in operations over the past year due to the impact of the COVID-19 pandemic. The airports with the highest decreases in diversions were LaGuardia (LGA) (with 81 percent), Newark (EWR) (76.1 percent), and JFK (70.4 percent). (*See*, Appendix I for explanations of the Core 30 airport codes.)



Core 30 Total Diversions			
FY16-20 Avg	FY19	FY20	%Change
16,393	19,266	9,534	-50.5%

Airport	Rank*	FY16-20 Avg	FY19	FY20
ATL	2	948	990	553
BOS	21	388	498	232
BWI	25	293	376	188
CLT	4	727	904	492
DCA	16	468	536	279
DEN	6	842	1,102	388
DFW	1	1,466	1,651	1,049
DTW	29	306	387	143
EWR	19	721	1,122	268
FLL	9	505	539	343
HNL	30	70	103	97
IAD	17	400	497	275
IAH	7	824	937	377
JFK	26	526	594	176
LAS	10	461	430	338

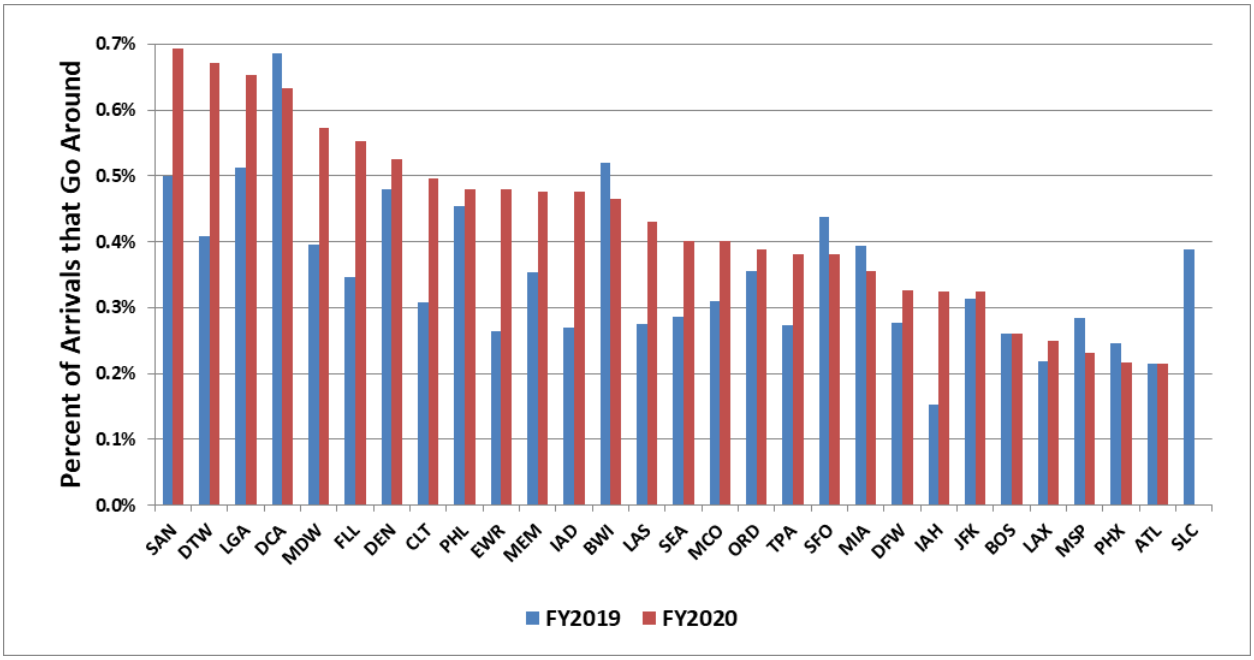
Airport	Rank*	FY16-20 Avg	FY19	FY20
LAX	14	423	431	286
LGA	24	742	1,043	198
MCO	11	497	563	334
MDW	12	532	572	330
MEM	3	614	570	510
MIA	18	594	724	271
MSP	27	425	505	159
ORD	5	1,145	1,480	447
PHL	20	401	446	254
PHX	13	474	475	305
SAN	28	274	261	145
SEA	22	336	531	225
SFO	23	307	321	209
SLC	7	366	320	377
TPA	14	316	358	286

*Ranked by number of FY2020 diversions.

Source: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), Aviation System Performance Metrics (ASPM), October 4, 2021.

Go-Arounds at Core 30 Airports

FY2019 and FY2020 go-arounds as a percent of arrival operations at each Core 30 airport (except Honolulu) appear below. In FY2020, go-arounds at each Core 30 airport, did not go above 0.7 percent. Average go-arounds as a percent of arrivals across all Core 30 airports rose slightly, to about 0.4 percent. This occurred because COVID-related declines in arrival operations exceeded declines in go-arounds. (The estimates presented here are based on ASPM and CountOps data.) (*See*, Appendix I for explanations of the Core 30 airport codes.)



Airport	FY16-20 Avg	FY19	FY20
ATL	0.2%	0.2%	0.2%
BOS	0.3%	0.3%	0.3%
BWI	0.4%	0.5%	0.5%
CLT	0.3%	0.3%	0.5%
DCA	0.6%	0.7%	0.6%
DEN	0.5%	0.5%	0.5%
DFW	0.3%	0.3%	0.3%
DTW	0.5%	0.4%	0.7%
EWR	0.3%	0.3%	0.5%
FLL	0.4%	0.3%	0.6%
IAD	0.3%	0.3%	0.5%
IAH	0.2%	0.2%	0.3%
JFK	0.3%	0.3%	0.3%
LAS	0.3%	0.3%	0.4%
LAX	0.2%	0.2%	0.2%

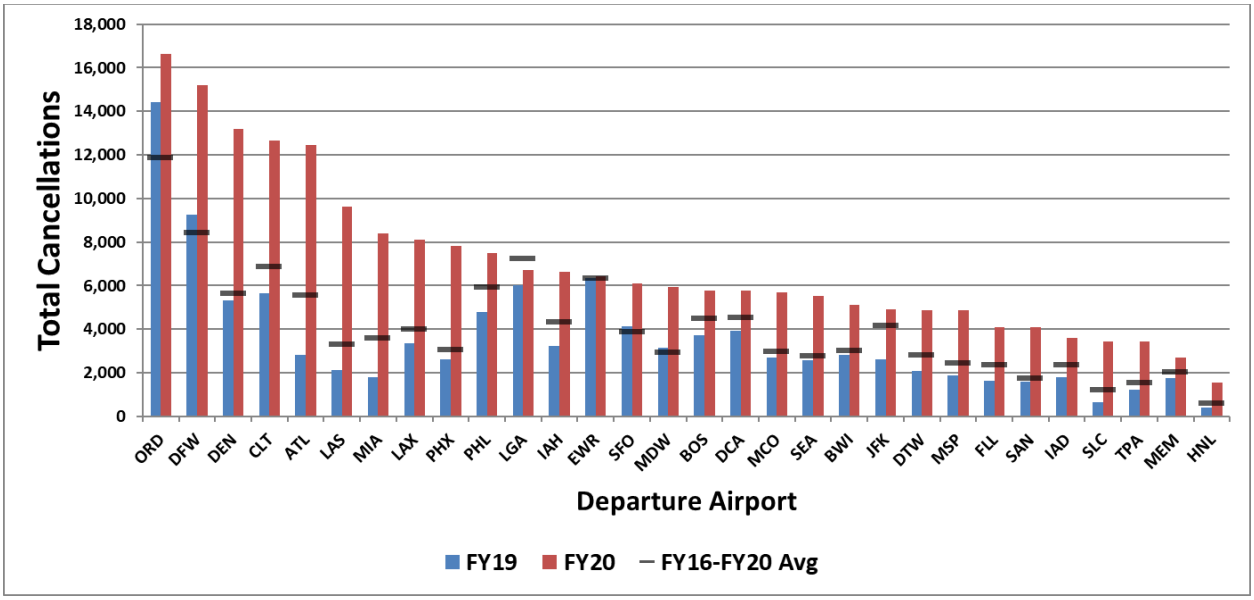
Airport	FY16-20 Avg	FY19	FY20
LGA	0.5%	0.5%	0.7%
MCO	0.3%	0.3%	0.4%
MDW	0.4%	0.4%	0.6%
MEM	0.4%	0.4%	0.5%
MIA	0.4%	0.4%	0.4%
MSP	0.3%	0.3%	0.2%
ORD	0.3%	0.4%	0.4%
PHL	0.5%	0.5%	0.5%
PHX	0.2%	0.2%	0.2%
SAN	0.6%	0.5%	0.7%
SEA	0.3%	0.3%	0.4%
SFO	0.4%	0.4%	0.4%
SLC*	0.4%	0.4%	NA
TPA	0.3%	0.3%	0.4%

* FY2020 data for Salt Lake City (SLC) are not yet available.

Sources: Go-arounds: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), Aviation System Performance Metrics (ASPM), December 9, 2020; Arrivals: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), CountOps, December 11, 2020.

Cancellations at Core 30 Airports

During FY2020, flight departure cancellations at Core 30 airports almost doubled, increasing by 96.5 percent; rising at every airport. As stated previously, cancellations may be due to weather, system delays, equipment issues, or other reasons, such as the unforeseen March 2020 fall in air travel due to the COVID-19 pandemic. The graph and table below show flight cancellations at Core 30 airports for FY2019 and FY2020. During FY2020, the airports with the highest number of cancellations were Chicago O'Hare (ORD), Dallas-Fort Worth (DFW), Denver (DEN), Charlotte (CLT), and Atlanta (ATL). Each had over 12,000 cancellations. (*See*, Appendix I for explanations of the Core 30 airport codes.)



Core 30 Total Cancellations			
FY16-20 Avg	FY19	FY20	%Change
122,198	106,248	208,759	96.5%

Airport	FY16-20 Avg	FY19	FY20
ATL	5,576	2,799	12,459
BOS	4,496	3,709	5,773
BWI	3,036	2,822	5,128
CLT	6,889	5,662	12,652
DCA	4,546	3,904	5,751
DEN	5,662	5,327	13,169
DFW	8,417	9,247	15,207
DTW	2,797	2,071	4,885
EWR	6,343	6,356	6,416
FLL	2,346	1,620	4,103
HNL	598	396	1,532
IAD	2,366	1,789	3,601
IAH	4,339	3,218	6,633
JFK	4,181	2,600	4,904
LAS	3,310	2,123	9,605

Airport	FY16-20 Avg	FY19	FY20
LAX	4,010	3,330	8,112
LGA	7,244	6,034	6,709
MCO	2,985	2,695	5,705
MDW	2,923	3,158	5,916
MEM	2,019	1,751	2,694
MIA	3,612	1,806	8,375
MSP	2,452	1,871	4,881
ORD	11,867	14,405	16,617
PHL	5,940	4,800	7,488
PHX	3,073	2,617	7,838
SAN	1,767	1,578	4,096
SEA	2,759	2,561	5,537
SFO	3,872	4,144	6,110
SLC	1,211	647	3,433
TPA	1,562	1,208	3,430

Source: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), Aviation System Performance Metrics (ASPM), December 31, 2020.

Section 4. Traffic Management Initiatives

Traffic Management Initiatives (TMIs) are programs and tools that ATC may use to manage air traffic. These initiatives can take a number of forms, depending on the need and situation. Some TMIs are used to manage excess demand or a lowered acceptance rate at a particular airport. Other TMIs are used to manage traffic issues in the en route environment usually caused by convective weather. The TMIs reported in this report include:

Ground Delay Programs (GDP)

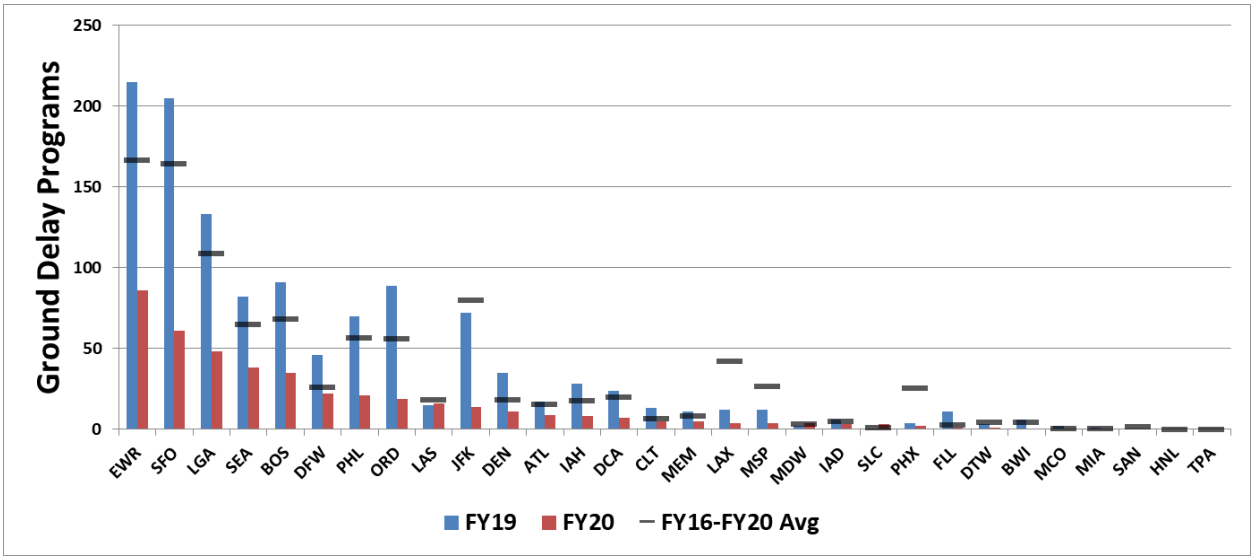
Ground stops (GS)

Airspace Flow Programs (AFP)

Holdings

Ground Delay Programs at Core 30 Airports

A ground delay program (GDP) is a TMI where aircraft are delayed at their departure airport in order to reconcile demand with capacity at their arrival airport. They are airport-specific, therefore, each GDP is reported for a particular airport. In FY2020, OPSNET data shows Newark (EWR), San Francisco (SFO), and LaGuardia (LGA) had the highest number of GDPs. Together, these three airports accounted for 46 percent of GDPs at Core 30 airports. During FY2020, due to the impact of the COVID-19 pandemic on the volume of air traffic, GDPs decreased by 64.6 percent across all Core 30 airports, from 1,205 to 427. (*See*, Appendix I for explanations of the Core 30 airport codes.)



Total Core 30 GDPs			
FY16-20 Avg	FY19	FY20	%Change
1,012	1,205	427	-64.6%

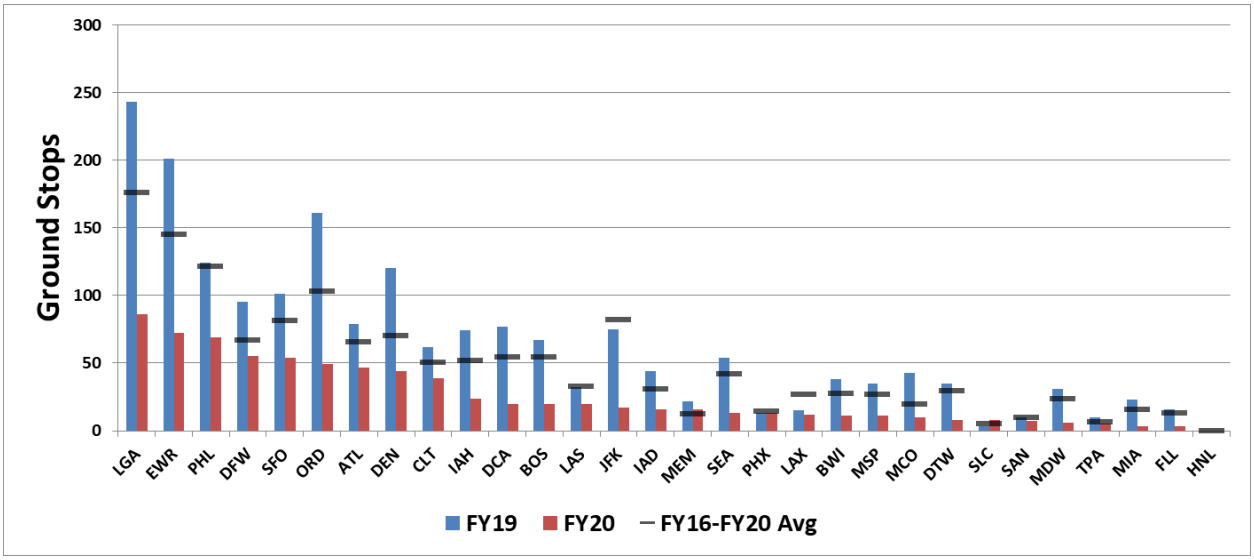
Airport	FY16-20 Avg	FY19	FY20
ATL	16	17	9
BOS	68	91	35
BWI	4	6	0
CLT	7	13	5
DCA	20	24	7
DEN	18	35	11
DFW	26	46	22
DTW	4	3	1
EWR	167	215	86
FLL	3	11	1
HNL	0	0	0
IAD	5	6	3
IAH	18	28	8
JFK	80	72	14
LAS	18	15	16

Airport	FY16-20 Avg	FY19	FY20
LAX	42	12	4
LGA	109	133	48
MCO	0	2	0
MDW	3	2	4
MEM	8	11	5
MIA	0	1	0
MSP	26	12	4
ORD	56	89	19
PHL	57	70	21
PHX	26	4	2
SAN	2	0	0
SEA	65	82	38
SFO	164	205	61
SLC	1	0	3
TPA	0	0	0

Source: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), Operations Network (OPSNET), February 16, 2021.

Ground Stops at Core 30 Airports

Ground stops are the most restrictive form of TMI because they hold all aircraft, within the scope of the ground stop, at their departure airports until conditions at the destination airport allow for their arrival. Ground stops only affect arrivals to a specific airport (not departures) and, like GDPs, are airport-specific. According to OPSNET data, in FY2020, Core 30 airports with the highest number of ground stops were LaGuardia (LGA), Newark (EWR), and Philadelphia (PHL). During FY2020, due to the impact of the pandemic on the volume of air traffic, the number of ground stops decreased by 60.2 percent across all Core 30 airports, from 1,903 to 758. (*See*, Appendix I for explanations of the Core 30 airport codes.)



Total Core 30 Ground Stops			
FY16-20 Avg	FY19	FY20	%Change
1,464	1,903	758	-60.2%

Airport	FY16-20 Avg	FY19	FY20
ATL	66	79	47
BOS	54	67	20
BWI	27	38	11
CLT	50	62	39
DCA	55	77	20
DEN	70	120	44
DFW	67	95	55
DTW	29	35	8
EWR	145	201	72
FLL	13	16	3
HNL	0	0	0
IAD	31	44	16
IAH	52	74	24
JFK	82	75	17
LAS	33	32	20

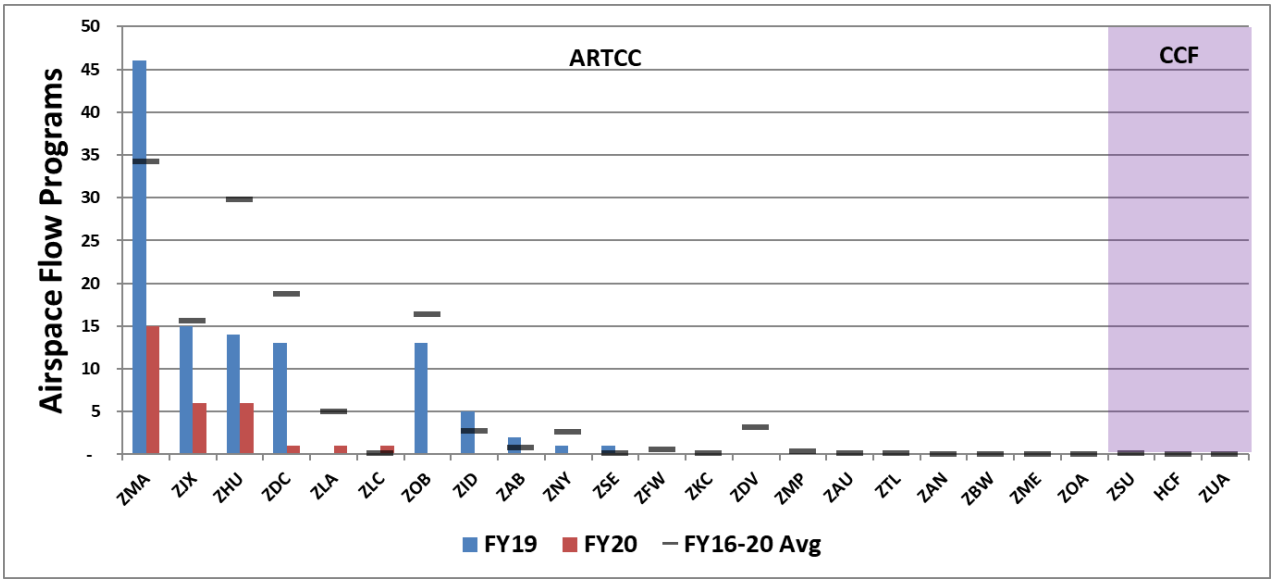
Airport	FY16-20 Avg	FY19	FY20
LAX	27	15	12
LGA	176	243	86
MCO	20	43	10
MDW	24	31	6
MEM	13	22	16
MIA	16	23	3
MSP	27	35	11
ORD	103	161	49
PHL	122	124	69
PHX	15	13	13
SAN	10	10	7
SEA	42	54	13
SFO	81	101	54
SLC	5	3	8
TPA	6	10	5

Source: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), Operations Network (OPSNET), February 16, 2021.

Airspace Flow Programs by Center

Imagine a line drawn in space in association with a constraint, usually convective weather. Under an airspace flow program, any flights filed that crosses the line (usually only in one direction) are assigned an expected departure clearance time (EDCT), to ensure that it arrives at the line, or "boundary," at a time when it can be accommodated. In FY2020, there were only 30 airspace flow programs (AFP) imposed by air traffic managers versus 110 in FY2019, a decrease of 72.7 percent, mainly reflecting the impact of the COVID-19 pandemic on air traffic. Over the five years from FY2016 to FY2020, the number of AFPs averaged 131 per year.

The graph and table below show airspace flow programs by ARTCC for FY2019 and FY2020. In FY2020, AFPs mainly affected Miami (ZMA), Jacksonville (ZJX), and Houston (ZHU). Together, these centers accounted for 27 of the 30 AFPs. These estimates are based on National Traffic Management Log (NTML) data. (*See*, Appendix I for explanations of the ARTCC and CCF codes.)



* Data for CCF JCF are not available.

Total Centers Air Flow Programs			
FY16-20 Avg	FY19	FY20	%Change
131	110	30	-72.7%

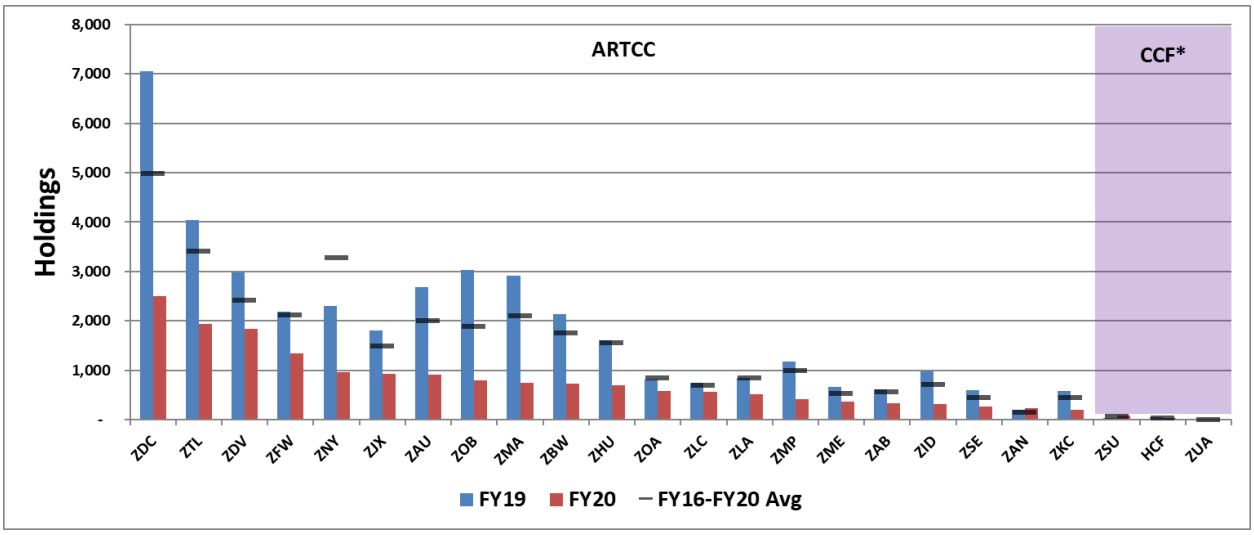
Center	FY16-20 Avg	FY19	FY20
HCF	0	0	0
ZAB	1	2	0
ZAN	0	0	0
ZAU	0	0	0
ZBW	0	0	0
ZDC	19	13	1
ZDV	3	0	0
ZFW	1	0	0
ZHU	30	14	6
ZID	3	5	0
ZJX	16	15	6
ZKC	0	0	0

Center	FY16-20 Avg	FY19	FY20
ZLA	5	0	1
ZLC	0	0	1
ZMA	34	46	15
ZME	0	0	0
ZMP	0	0	0
ZNY	3	1	0
ZOA	0	0	0
ZOB	16	13	0
ZSE	0	1	0
ZSU	0	0	0
ZTL	0	0	0
ZUA	0	0	0

Source: Federal Aviation Administration, Air Traffic Organization, Technical Operations (AJW), National Traffic Management Log (NTML), April 7, 2021.

Holdings by Center

A holding occurs when an aircraft is deliberately delayed en route by flying in a repeating rotational pattern. They are typically implemented when there is traffic congestion or convective weather at the destination airport or an adjacent facility. OPSNET data shows among Air Route Traffic Control Centers (ARTCC), the highest numbers of airborne holdings occur in DC (ZDC), Atlanta (ZTL), Denver (ZDV), and Fort Worth (ZFW). (*See*, the graph and table below.) In FY2020, due to the impact of the COVID-19 pandemic on air travel, the number of airborne holdings fell by 56.7 percent. (*See*, Appendix I for explanations of the ARTCC and combined control facility (CCF) codes.)



* Data for CCF JCF are not available.

Total Center Flight Holdings			
FY16-20 Avg	FY19	FY20	%Change
33,368	40,084	17,337	-56.7%

Center	FY16-20 Avg	FY19	FY20
ZAB	567	609	329
ZAN	148	197	234
ZAU	1,997	2,686	913
ZBW	1,763	2,139	728
ZDC	4,980	7,051	2,504
ZDV	2,423	2,987	1,837
ZFW	2,128	2,190	1,342
ZHU	1,555	1,600	704
ZID	714	976	325
ZJX	1,487	1,813	935
ZKC	457	576	200
ZLA	840	851	510

Center	FY16-20 Avg	FY19	FY20
ZLC	697	755	565
ZMA	2,111	2,920	750
ZME	540	664	372
ZMP	993	1,174	418
ZNY	3,281	2,308	966
ZOA	849	817	578
ZOB	1,885	3,026	802
ZSE	451	604	273
ZTL	3,407	4,044	1,935
ZSU	61	42	79
HCF	31	55	38
ZUA	1	0	0

Source: Federal Aviation Administration, Air Traffic Organization, Office of Performance Analysis (AJR-G), Operations Network (OPSNET), January 7, 2021.

Section 5. Safety Metrics

The U.S. national airspace system is the safest air transportation system in the world. This report presents metrics used to measure the safety of the NAS:

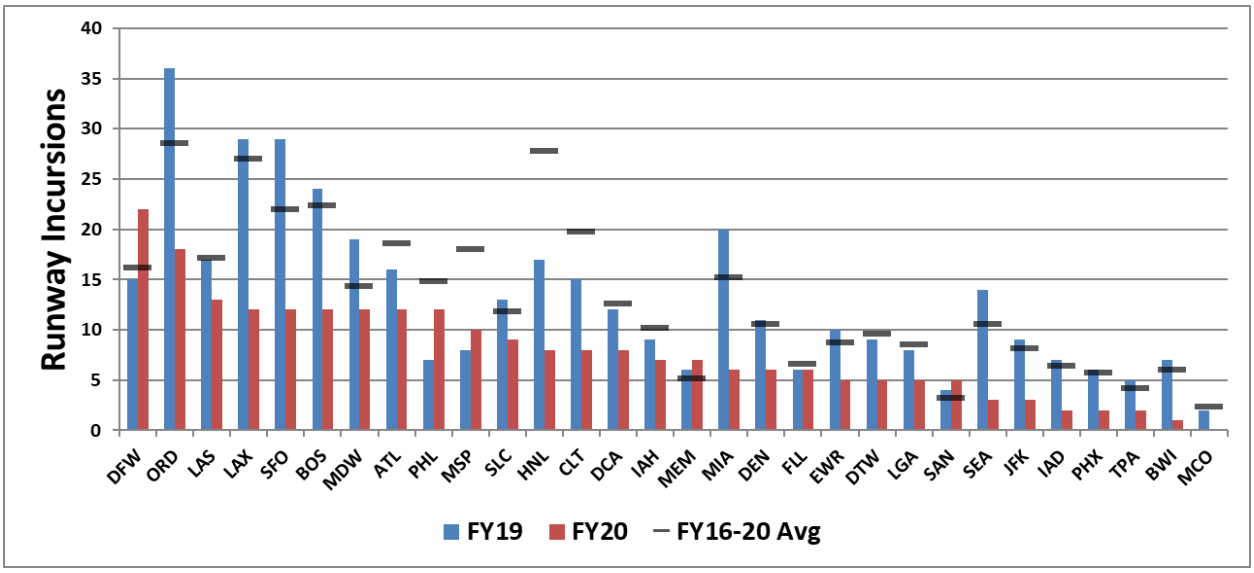
Runway Incursions

Incursions by Type

Loss of Standard Separation Count

Runway Incursions at Core 30 Airports

A runway incursion is any occurrence involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft. Across all Core 30 airports, the number of runway incursions declined from 390 in FY2019 to 233 in FY2020—a decrease of 40.3 percent, mainly due to the impact of the COVID-19 pandemic on the downturn in air traffic; however, increases occurred at Philadelphia (PHL), Dallas-Fort Worth (DFW), and Minneapolis (MSP). The graph and table below show numbers of runway incursions by airport. Incursions by airport and by type appear on the next page. (*See*, Appendix I for explanations of the Core 30 airport codes.) (This, and the following page, shows runway incursions only. Previous editions *of Air Traffic By the Numbers* included surface incidents as well.)



Core 30 Total Runway Incursions			
FY16-20 Avg	FY19	FY20	%Change
393	390	233	-40.3%

Airport	FY16-20 Avg	FY19	FY20
ATL	19	16	12
BOS	22	24	12
BWI	6	7	1
CLT	20	15	8
DCA	13	12	8
DEN	11	11	6
DFW	16	15	22
DTW	10	9	5
EWR	9	10	5
FLL	7	6	6
HNL	28	17	8
IAD	6	7	2
IAH	10	9	7
JFK	8	9	3
LAS	17	17	13

Airport	FY16-20 Avg	FY19	FY20
LAX	27	29	12
LGA	9	8	5
MCO	2	2	0
MDW	14	19	12
MEM	5	6	7
MIA	15	20	6
MSP	18	8	10
ORD	29	36	18
PHL	15	7	12
PHX	6	6	2
SAN	3	4	5
SEA	11	14	3
SFO	22	29	12
SLC	12	13	9
TPA	4	5	2

*Honolulu is coded as HNL or HCF in the source data.

Source: Federal Aviation Administration, Air Traffic Organization, Safety and Technical Training (AJI), April 9, 2021.

Incursions by Type at Core 30 Airports, FY2020

Airport	A	B	C	D	E	Totals
ATL	0	0	3	9	0	12
BOS	1	0	9	2	0	12
BWI	0	0	1	0	0	1
CLT	0	0	7	1	0	8
DCA	0	0	7	1	0	8
DEN	0	0	4	2	0	6
DFW	0	0	13	9	0	22
DTW	0	0	2	3	0	5
EWR	0	0	4	1	0	5
FLL	0	1	4	1	0	6
HNL	0	0	6	2	0	8
IAD	0	0	0	2	0	2
IAH	0	0	4	3	0	7
JFK	0	0	2	1	0	3
LAS	0	0	5	8	0	13
LAX	0	0	6	6	0	12
LGA	0	0	3	2	0	5
MCO	0	0	0	0	0	0
MDW	0	1	2	9	0	12
MEM	0	2	2	3	0	7
MIA	0	0	6	0	0	6
MSP	0	0	3	7	0	10
ORD	0	0	12	6	0	18
PHL	0	0	10	2	0	12
PHX	0	0	1	1	0	2
SAN	0	0	4	1	0	5
SEA	0	0	3	0	0	3
SFO	0	0	9	3	0	12
SLC	0	0	4	5	0	9
TPA	0	0	0	2	0	2

Category A - A serious incident in which a collision was narrowly avoided.

Category B - An incident in which separation decreases and there is a significant potential for collision, which may result in a time critical corrective/evasive response to avoid a collision.

Category C - An incident characterized by ample time and/or distance to avoid a collision.

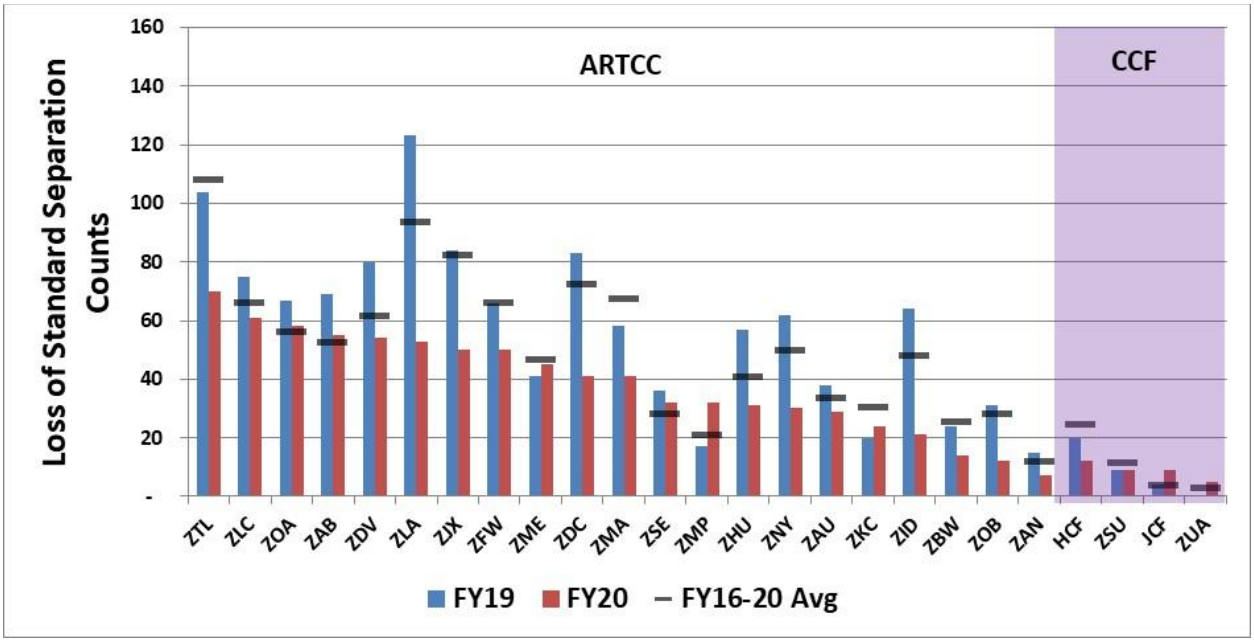
Category D - An incident that meets the definition of a runway incursion such as incorrect presence of a single vehicle/person/aircraft on the protected area of a surface designated for the landing and take-off of aircraft of aircraft but with no immediate safety consequences.

Category E - An incident in which insufficient or conflicting evidence of the event precludes assigning another category.

Source: Federal Aviation Administration, Air Traffic Organization, Safety and Technical Training (AJI), April 9, 2021.

Loss of Standard Separation Count, by Center

Standard separation is a specified separation minima between airborne aircraft in controlled airspace. Breaches of such minima are based on airborne loss event data. Losses of standard separation are reported by Air Route Traffic Control Center (ARTCC) below. Across all centers, losses of standard separation fell by 32.2 percent in FY2020, mainly due to the impact of the COVID-19 pandemic on air traffic. The three highest decreases occurred at the Atlanta (ZTL), Salt Lake City (ZLC), and Oakland (ZOA) centers. Three increases occurred at the Minneapolis (ZMP), Kansas City (ZKC), and Memphis (ZME) centers (*See*, Appendix I for explanations of the ARTCC and combined control facilities (CCF).)



Total Losses of Standard Separation			
FY16-20 Avg	FY19	FY20	%Change
1,140	1,247	845	-32.2%

Center	FY16-20 Avg	FY19	FY20
HCF	25	20	12
JCF	4	4	9
ZAB	53	69	55
ZAN	12	15	7
ZAU	34	38	29
ZBW	26	24	14
ZDC	73	83	41
ZDV	62	80	54
ZFW	66	66	50
ZHU	41	57	31
ZID	48	64	21
ZJX	83	84	50
ZKC	31	20	24

Center	FY16-20 Avg	FY19	FY20
ZLA	94	123	53
ZLC	66	75	61
ZMA	68	58	41
ZME	47	41	45
ZMP	21	17	32
ZNY	50	62	30
ZOA	56	67	58
ZOB	29	31	12
ZSE	29	36	32
ZSU	12	9	9
ZTL	108	104	70
ZUA	3	0	5

Source: Federal Aviation Administration, Air Traffic Organization, Office of Policy and Performance (AJI-3), unpublished Airborne Loss Event data, April 9, 2021.

Section 6. Other ATO Topics

There are a variety of other aspects of the NAS which are of special interest. This report presents the following:

Flight Service Stations

Commercial Space Launch Activity

Flight Service Stations

Flight services are delivered to operators in Alaska through federal certified professional controllers at 17 Flight Service Stations and throughout the contiguous United States, Hawaii, and Puerto Rico via Federal Contract Flight Service Station (FCFSS) specialists at two centralized hubs. Services include, but are not limited to: preflight weather briefings, flight planning, in-flight advisory services, search and rescue (SAR), and processing notices to airmen (NOTAMs).

Self-briefing and other automated services are provided by the FCFSS vendor. Web services include interactive graphical capabilities to view a wide range of weather and aeronautical information, flight planning, activating and closing flight plans, and more. Pilots may also access automated voice services to receive current and forecast conditions at specific airports, and receive updates for adverse conditions, including TFRs.

Flight Service also delivers the FAA Weather Camera Program. This program features an expanding network of nearly 300 camera sites in Alaska, Colorado, and Montana (other sites, including Hawaii, coming soon) and over 175 sites hosted by NAV Canada, Canada's civil air navigation service provider. The weather cameras website provides pilots with additional information for improved situational awareness and decision-making. On the website, pilots can see current images at specific locations, compare the images to clear day views, or playback a loop of past images to establish weather trends. The website also delivers a variety of safety of flight information including adverse conditions, current and forecast conditions, pilot reports, and aeronautical information.

ALASKA FSS	**Barrow FSS (BRW)** **Cold Bay FSS (CDB)** **Deadhorse FSS (SCC)** **Dillingham FSS (DLG)** **Fairbanks FSS (FAI)** **Homer FSS (HOM)** **Iliamna FSS (ILI)** **Juneau FSS (JNU)** **Kenai FSS (ENA)** **Ketchikan FSS (KTN)** **Kotzebue FSS (OTZ)** **McGrath FSS (MCG)** **Nome FSS (OME)** **Northway FSS (ORT)** **Palmer FSS (LBE)** **Sitka FSS (SIT)** **Talkeetna FSS (TKA)**
FEDERAL CONTRACT FSS	**Leidos FCFSS Washington Hub (DCA)** **Leidos FCFSS Fort Worth Hub (FTW)**

FAA Flight Services

FAA Facilities – Alaska Flight Service							
Year	Pilot Briefs	Flight Plans Filed	Preflight Calls	Aircraft Contacts	Airport Advisories	NOTAMs Issued	Total SAR
FY 2015	104,535	199,663	62,847	476,336	296,363	175,165	4,778
FY 2016	101,510	191,767	56,214	490,342	291,224	131,607	4,653
FY 2017	94,553	194,641	52,504	485,847	305,915	135,226	3,662
FY 2018	89,592	210,626	52,200	521,048	325,140	158,003	4,869
FY 2019	92,070	209,024	52,980	542,550	327,130	166,848	6,924
FY 2020	71,570	141,492	39,031	400,181	243,844	166,954	3,021

Federal Contract Flight Services							
Year	Pilot Briefs	Flight Plans Filed	Preflight Calls	Inflight Contacts	Flight Data Calls	NOTAMs Issued	Total SAR
FY 2015	1,029,623	719,349	1,727,671	391,632	219,659	251,610	No Data
FY 2016	892,170	608,761	1,495,599	326,820	194,712	227,576	3,782*
FY 2017	829,909	515,868	1,344,640	314,363	175,203	216,997	8,145
FY 2018	797,746	462,207	1,255,510	286,392	178,110	216,249	9,337
FY 2019	747,731	387,694	1,158,005	257,701	166,546	200,192	9,728
FY 2020	541,004	195,635	782,145	175,361	121,118	179,612	13,195

* Data delivered starting May 2016.

Web Services/DUATs		
Year	Pilot Briefs*	Flight Plans Filed
FY 2015	13,117,576	3,130,797
FY 2016	17,705,259	3,002,163
FY 2017	29,079,619	2,592,214
FY 2018	26,349,042	2,229,961
FY 2019	18,946,978	1,690,246
FY 2020	17,290,280	1,272,098

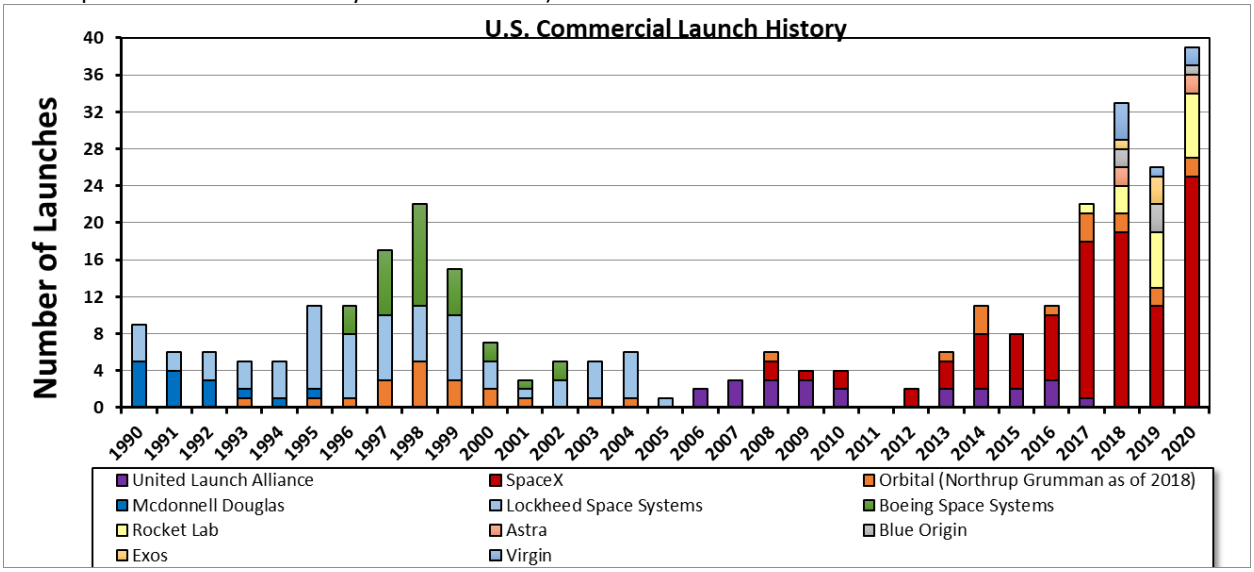
* Represents the number of hits to contract web services including DUATs (DUATs decommissioned May, 2018).

United States NOTAM Office (USNOF)		
Year	Domestic	International
FY 2015	1,216,089	561,972
FY 2016	1,327,858	603,930
FY 2017	1,455,238	760,015
FY 2018	1,569,386	874,091
FY 2019	1,670,499	969,951
FY 2020	1,474,047	873,025

Source: FAA, Air Traffic Organization, Flight Service (AJR-B), Email communication, April 29, 2021; FAA, Air Traffic Organization, U.S. NOTAM Office (AJV-A370), Calculations based on email communication, May 3, 2021.

Commercial Space Launch Activity

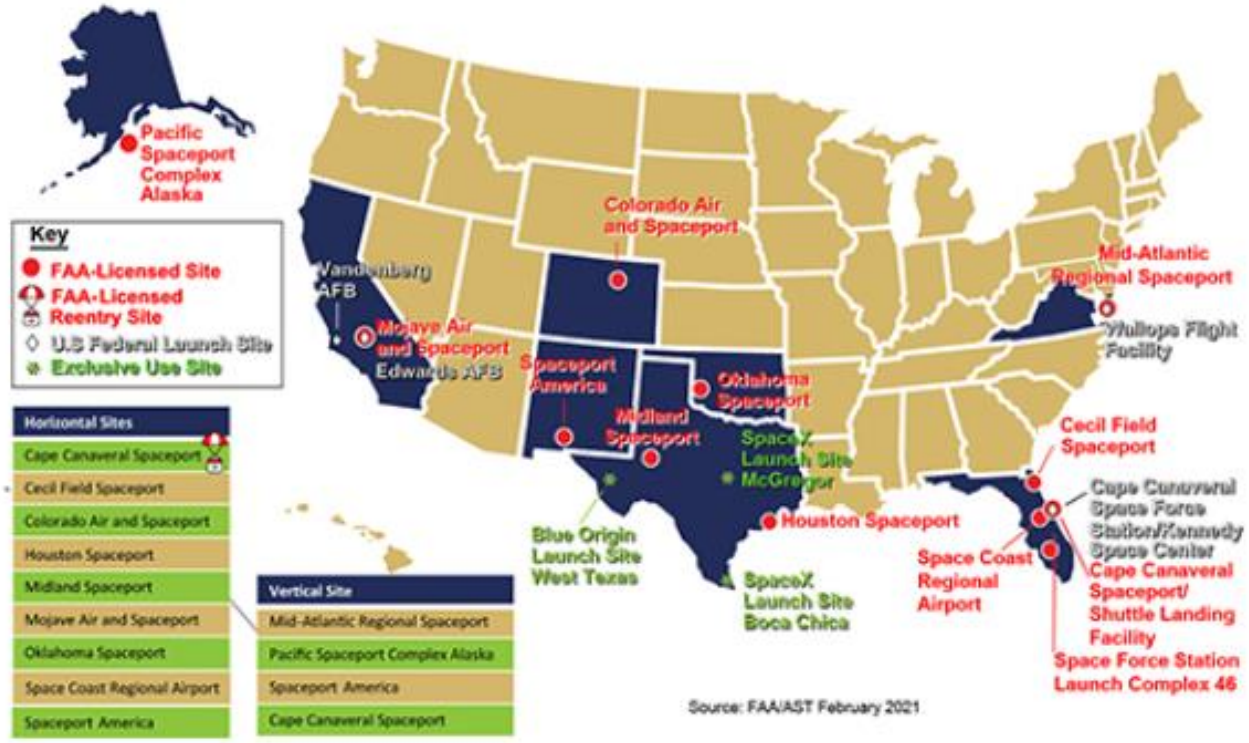
In CY2020, the FAA licensed 39 U.S. orbital commercial space launches: SpaceX, 25; Rocket Lab, 7 (from New Zealand); and Orbital, 2 (part of Northrup Grumman Innovation Systems as of 2018).



Note: A commercial launch is a launch that is internationally competed (i.e., available in principle to international launch providers) or whose primary payload is commercial in nature. FAA-licensed launches carrying captive government (NASA and DOD) or industry payloads are counted here. Data for 2018-2020 include launch failures and successes, and subspace and suborbital launches.

Sources: Federal Aviation Administration, Commercial Space Transportation (AST), The Annual Compendium of Commercial Space Transportation, various years; FAA, Commercial Space Transportation (AST), Launches, as of January 8, 2021. https://www.faa.gov/data_research/commercial_space_data/launches/?type=license; U.S. Dept. of Transportation, Bureau of Transportation Statistics, National Transportation Statistics, Table 1-39, January 17, 2019. https://www.bts.gov/browse-statistical-products-and-data/national-transportation-statistics/national-transportation-8

U.S. Spaceports – Commercial/Government/Private Active Sites



Source: Federal Aviation Administration, Commercial Space Transportation (AST), February 2021. https://www.faa.gov/about/office_org/headquarters_offices/ast/programs/office_spaceports/

Appendix I. Facility Codes

Core 30 Airports

(Source: System Data and Infrastructure Group, Office of Performance Analysis, Systems Operations Services, Air Traffic Organization, FAA (AJR-G2).)

Code	Airport	Code	Airport
ATL	Hartsfield-Jackson Atlanta International	LAX	Los Angeles International
BOS	Boston Logan International	LGA	New York LaGuardia
BWI	Baltimore/Washington International	MCO	Orlando International
CLT	Charlotte Douglas International	MDW	Chicago Midway
DCA	Ronald Reagan Washington National	MEM	Memphis International
DEN	Denver International	MIA	Miami International
DFW	Dallas-Fort Worth International	MSP	Minneapolis/St. Paul International
DTW	Detroit Metropolitan Wayne County	ORD	Chicago O`Hare International
EWR	Newark Liberty International	PHL	Philadelphia International
FLL	Fort Lauderdale/Hollywood International	PHX	Phoenix Sky Harbor International
HNL	Honolulu International	SAN	San Diego International
IAD	Washington Dulles International	SEA	Seattle/Tacoma International
IAH	George Bush Houston Intercontinental	SFO	San Francisco International
JFK	New York John F. Kennedy International	SLC	Salt Lake City International
LAS	Las Vegas McCarran International	TPA	Tampa International

Stand-Alone Terminal Radar Control (TRACON) Facilities*

LocID	TRACON	LocID	TRACON
A11	Anchorage TRACON	NCT	Northern California TRACON
A80	Atlanta TRACON	P31	Pensacola TRACON
A90	Boston TRACON	P50	Phoenix TRACON
C90	Chicago TRACON	P80	Portland TRACON
D01	Denver TRACON	PCT	Potomac TRACON
D10	Dallas-Fort Worth TRACON	R90	Omaha TRACON
D21	Detroit TRACON	S46	Seattle TRACON
F11	Central Florida TRACON	S56	Salt Lake City TRACON
I90	Houston TRACON	SCT	Southern California TRACON
L30	Las Vegas TRACON	T75	St Louis TRACON
M03	Memphis TRACON	U90	Tucson TRACON
M98	Minneapolis TRACON	Y90	Yankee TRACON
N90	New York TRACON		

*Cape Cod (K90) merged with Boston TRACON (A90); Meridian (NMM) is now a military, not a civilian TRACON.

Air Route Traffic Control Centers (ARTCC) and Combined Control Facilities (CCF)

LocID	Center	LocID	Center
HCF	Honolulu Control Facility	ZLA	Los Angeles CA ARTCC
JCF	Joshua Tree Control Facility	ZLC	Salt Lake City UT ARTCC
ZAB	Albuquerque NM ARTCC	ZMA	Miami FL ARTCC
ZAN	Anchorage AK ARTCC	ZME	Memphis TN ARTCC
ZAU	Chicago IL ARTCC	ZMP	Minneapolis MN ARTCC
ZBW	Nashua NH ARTCC (Boston)	ZNY	New York NY ARTCC
ZDC	Leesburg VA ARTCC (DC)	ZOA	Oakland CA ARTCC
ZDV	Denver CO ARTCC	ZOB	Cleveland OH ARTCC
ZFW	Fort Worth TX ARTCC	ZSE	Seattle WA ARTCC
ZHU	Houston TX ARTCC	ZSU	San Juan PR Control Facility
ZID	Indianapolis IN ARTCC	ZTL	Atlanta GA ARTCC
ZJX	Jacksonville FL ARTCC	ZUA	Guam Control Facility
ZKC	Kansas City KS ARTCC		

Appendix II. Other FAA Airport Lists

In addition to the Core 30 airports, FAA also uses several other airport lists, including ASPM 77, OEP 35, and OPSNET 45 airports and 34 Select TRACONs.

ASPM 77 Airports

This is an FAA list of 77 airports, including the Core 30, OEP 35, and other airports. The ASPM (Aviation System Performance Metrics) data includes flights to and from the 77 ASPM airports and all flights by ASPM carriers, as well as flights by those carriers to international and domestic non-ASPM airports. (Source: System Data and Infrastructure Group, Office of Performance Analysis, Systems Operations Services, Air Traffic Organization, FAA (AJR-G2).) (*See*, Appendix I for the list of Core 30 airports. For OEP 35 airports, s*ee* the OEP 35 airport list on the next page.)

Code	Airport
ABQ	Albuquerque International Sunport
ANC	Ted Stevens Anchorage International
ATL	Hartsfield-Jackson Atlanta International
AUS	Austin-Bergstrom International
BDL	Bradley International
BHM	Birmingham International
BNA	Nashville International
BOS	Boston Logan International
BUF	Buffalo Niagara International
BUR	Bob Hope (Burbank/Glendale/Pasadena)
BWI	Baltimore/Washington International
CLE	Cleveland Hopkins International
CLT	Charlotte Douglas International
CVG	Cincinnati/Northern Kentucky International
DAL	Dallas Love Field
DAY	Dayton International
DCA	Ronald Reagan Washington National
DEN	Denver International
DFW	Dallas/Fort Worth International
DTW	Detroit Metropolitan Wayne County
EWR	Newark Liberty International
FLL	Fort Lauderdale/Hollywood International
GYY	Gary Chicago International
HNL	Honolulu International
HOU	Houston Hobby
HPN	Westchester County
IAD	Washington Dulles International
IAH	George Bush Houston Intercontinental
IND	Indianapolis International
ISP	Long Island Mac Arthur
JAX	Jacksonville International
JFK	New York John F. Kennedy International
LAS	Las Vegas McCarran International
LAX	Los Angeles International
LGA	New York LaGuardia
LGB	Long Beach
MCI	Kansas City International
MCO	Orlando International
MDW	Chicago Midway
MEM	Memphis International
MHT	Manchester
MIA	Miami International
MKE	Milwaukee General Mitchell International
MSP	Minneapolis/St. Paul International
MSY	Louis Armstrong New Orleans International
OAK	Oakland International
OGG	Kahului
OMA	Omaha Eppley Airfield
ONT	Ontario International
ORD	Chicago O'Hare International
OXR	Oxnard
PBI	Palm Beach International
PDX	Portland International
PHL	Philadelphia International
PHX	Phoenix Sky Harbor International
PIT	Pittsburgh International
PSP	Palm Springs International
PVD	Providence Francis Green State
RDU	Raleigh/Durham International
RFD	Greater Rockford
RSW	Southwest Florida International
SAN	San Diego International
SAT	San Antonio International
SDF	Louisville International
SEA	Seattle/Tacoma International
SFO	San Francisco International
SJC	Norman Mineta San Jose International
SJU	San Juan Luis Munoz International
SLC	Salt Lake City International
SMF	Sacramento International Airport
SNA	John Wayne Airport-Orange County
STL	Lambert Saint Louis International
SWF	Stewart International
TEB	Teterboro
TPA	Tampa International
TUS	Tucson International
VNY	Van Nuys

OEP 35 Airports

This is an FAA list of 35 commercial U.S. airports with significant air traffic. These airports serve major metropolitan areas and some also serve as hubs for airline operations. The OEP 35 (Operational Evolution Partnership) is made up of the Core 30, plus five other airports. In 2005, this list was replaced by the Core 30 list. (Source: System Data and Infrastructure Group, Office of Performance Analysis, Systems Operations Services, Air Traffic Organization, FAA (AJR-G2). https://aspm.faa.gov/aspmhelp/index/OEP_35.html.) (*See*, Appendix I for the list of Core 30 airports.)

Code	Airport	Code	Airport
ATL	Hartsfield-Jackson Atlanta International	LGA	New York LaGuardia
BOS	Boston Logan International	MCO	Orlando International
BWI	Baltimore/Washington International	MDW	Chicago Midway
CLE	Cleveland Hopkins International	MEM	Memphis International
CLT	Charlotte Douglas International	MIA	Miami International
CVG	Cincinnati/Northern Kentucky International	MSP	Minneapolis/St Paul International
DCA	Ronald Reagan Washington National	ORD	Chicago O`Hare International
DEN	Denver International	PDX	Portland International
DFW	Dallas/Fort Worth International	PHL	Philadelphia International
DTW	Detroit Metropolitan Wayne County	PHX	Phoenix Sky Harbor International
EWR	Newark Liberty International	PIT	Pittsburgh International
FLL	Fort Lauderdale/Hollywood International	SAN	San Diego International
HNL	Honolulu International	SEA	Seattle/Tacoma International
IAD	Washington Dulles International	SFO	San Francisco International
IAH	George Bush Houston Intercontinental	SLC	Salt Lake City International
JFK	New York John F Kennedy International	STL	Lambert Saint Louis International
LAS	Las Vegas McCarran International	TPA	Tampa International
LAX	Los Angeles International		

OPSNET 45 Airports

The FAA list of OPSNET 45 airports appear below. In the late 1990s, these were airports that contributed to 75 percent of NAS delays and that each had 500 or more operations per day. (Note, by FY2019, the number of OPSNET 45 airports with at least 500 operations per day fell to 36 airports.)

Code	Airport	Code	Airport
ABQ	Albuquerque International Sunport	MCO	Orlando International
ATL	Hartsfield-Jackson Atlanta International	MDW	Chicago Midway
BNA	Nashville International	MEM	Memphis International
BOS	Boston Logan International	MIA	Miami International
BWI	Baltimore/Washington International	MSP	Minneapolis/St Paul International
CLE	Cleveland Hopkins International	MSY	Louis Armstrong New Orleans International
CLT	Charlotte Douglas International	OAK	Oakland International
CVG	Cincinnati/Northern Kentucky International	ORD	Chicago O`Hare International
DCA	Ronald Reagan Washington National	PBI	Palm Beach International
DEN	Denver International	PDX	Portland International
DFW	Dallas/Fort Worth International	PHL	Philadelphia International
DTW	Detroit Metropolitan Wayne County	PHX	Phoenix Sky Harbor International
EWR	Newark Liberty International	PIT	Pittsburgh International
FLL	Fort Lauderdale/Hollywood International	RDU	Raleigh/Durham International
HOU	Houston Hobby	SAN	San Diego International
IAD	Washington Dulles International	SEA	Seattle/Tacoma International
IAH	George Bush Houston Intercontinental	SFO	San Francisco International
IND	Indianapolis International	SJC	Norman Mineta San Jose International
JFK	New York John F	SLC	Salt Lake City Internationa
LAS	Las Vegas McCarran International	STL	Lambert Saint Louis International
LAX	Los Angeles International	TEB	Teterboro
LGA	New York LaGuardia	TPA	Tampa International
MCI	Kansas City International		

34 Select TRACONs

The 34 Select are the TRACONs support the OPSNET 45 airports. (*See*, above for the list of OPSNET 45 airports.) (Source: System Data and Infrastructure Group, Office of Performance Analysis, Systems Operations Services, Air Traffic Organization, FAA (AJR-G2). https://aspm.faa.gov/aspmhelp/index/34_Select.html)

LocID	TRACON	LocID	TRACON
A80	Atlanta TRACON	MEM	Memphis International
A90	Boston TRACON	MIA	Miami International
ABQ	Albuquerque International	MSY	New Orleans International/Moisant
BNA	Nashville International	N90	New York TRACON
C90	Chicago TRACON (Elgin)	NCT	Northern California TRACON
CLE	Cleveland Hopkins International	P50	Phoenix TRACON
CLT	Charlotte/Douglas International	P80	Portland TRACON
CVG	Covington/Cincinnati International	PBI	Palm Beach International
D01	Denver TRACON	PCT	Potomac TRACON
D10	Dallas/Ft Worth TRACON	PHL	Philadelphia International
D21	Detroit TRACON	PIT	Pittsburgh International
I90	Houston TRACON	RDU	Raleigh Durham International
IND	Indianapolis International	S46	Seattle/Tacoma TRACON
L30	Las Vegas TRACON	S56	Salt Lake City TRACON
M98	Minneapolis TRACON	SCT	Southern California TRACON
MCI	Kansas City International	T75	St Louis TRACON
MCO	Orlando International	TPA	Tampa International

Glossary of Terms

34 Select TRACONs	The 34 Select are the TRACONs support the OPSNET 45 airports. (*See*, Appendix II for the lists of 34 Select TRACONs and OPSNET 45 airports.)
AAR	*See*, Airport Arrival Rate (AAR).
ADC	*See*, Average Daily Capacity (ADC).
ADR	*See*, Airport Departure Rate (ADR).
AFP	*See*, Airspace Flow Programs (AFP).
Airport Arrival Rate (AAR)	The number of arriving aircraft which an airport or airspace can accept from an ARTCC per hour.
Airport Departure Rate (ADR)	The number of aircraft that can depart an airport and the airspace can accept per hour.
Airport Operations	*See*, Operations.
Airspace Flow Programs (AFP)	Airspace flow programs (AFPs) manage demand-capacity imbalances through the issuance of estimated departure clearance times (EDCT) to flights traversing a flow constrained area (FCA). An AFP might be used, for example, to reduce the rate of flights through a center when that center has reduced en route capacity due to severe weather, replacing mile-in-trail (MIT) restrictions for a required reroute, managing airport arrival fix demand or controlling multiple airports within a terminal area.
Air Route Traffic Control Center (ARTCC)	A facility established to provide air traffic control service to aircraft operating on IFR flight plans within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft. Also known as en route or centers, there are 21 ARTCCs in the continental U.S. A list of the 21 ARTCCs appears in Appendix I.
Air Traffic Control (ATC)	A service operated by appropriate authority to promote the safe, orderly and expeditious flow of air traffic.
Air Traffic Control Tower (ATCT)	A terminal facility that uses air/ground communications, visual signaling, and other devices to provide ATC services to aircraft operating in the vicinity of an airport or on the movement area. Authorizes aircraft to land or takeoff at the airport controlled by the tower or to transit the Class D airspace area regardless of flight plan or weather conditions (IFR or VFR). A tower may also provide approach control services (radar or nonradar).
Army Radar Approach Control (ARAC).	An FAA air traffic control facility using radar and air/ground communications to provide approach control services to aircraft arriving, departing, or transiting the airspace controlled by the facility. Service is provided to both civilian and U.S. Army airports. Currently, the U.S. does not operate any ARACs.
ASM	*See*, Available Seat Miles (ASM).
ASPM	*See*, Aviation System Performance Metrics (ASPM).
ASPM 77 Airports	The ASPM 77 is an FAA list of 77 airports, including the Core 30, OEP 35, and other airports. The ASPM (Aviation System Performance Metrics) data includes flights to and from the 77 ASPM airports and all flights by ASPM carriers, as well as flights by those carriers to international and domestic non-ASPM airports. (*See*, Appendix II for the list of ASPM 77 airports.) (*See*, Appendix I for the list of Core 30 airports and Appendix II for the list of OEP 35 airports.)
ATC	*See*, Air Traffic Control.
ATCT	*See*, Air Traffic Control Tower.
Available Seat Miles (ASM)	The aircraft miles flown in each inter-airport segment, multiplied by the number of seats available for fare paying passenger use on that segment. Available seat miles are computed by summation of the products of the number of miles on each interairport segment, multiplied by the number of available seats on that segment.

Average Daily Capacity (ADC)	Average daily capacity is calculated as the sum of the airport departure rates (ADR) and the capacity airport arrival rates (AAR), divided by the number of days in the period under consideration.
Average Hourly Capacity (Called Rate)	*See*, Called Rate.
Aviation System Performance Metrics (ASPM)	Aviation system performance metrics (ASPM) data includes flights to and from 77 ASPM airports (including the Core 30 and OEP 35 airports) and all flights by ASPM carriers, as well as flights by those carriers to international and domestic non-ASPM airports. All IFR and some VFR flights are included. View this data on the OPSNET website. ASPM flight records fall into two groupings: (1) Efficiency flights are intended to capture all traffic handled by controllers at the ASPM airports and include flights with complete records and flights for which accurate estimates are possible due to only a few pieces of missing data; and, (2) ASPM flights exclude general aviation and military traffic, as well as local (non-itinerant) traffic and records for international flights missing data on the non-U.S. portion of the flight. ASPM contains key event times including actual, scheduled as well as the airline reported gate and runway times. It also synthesizes key times from the traffic flow management system (TFMS) and flight level information from the national traffic management log (NTML).
Called Rate	The hourly throughput that an airport's runways are able to sustain during periods of high demand. Called rates include all arrival and departure traffic that an airport can support. The called rate, or average hourly capacity, is the sum of the average arrival rate (AAR) and the average departure rate (ADR).
Cancellations	The set of cancelled departures as determined by a combination of scheduled flights not flown and TFMS flight plans that were cancelled and not re-filed for ASPM carriers and all other carriers reporting schedule data; and ASQP flight cancellations.
CCF	*See*, Combined Control Facility (CCF).
Center	Also known as air route traffic control center (ARTCC) or en Route. *See*, Air Route Traffic Control Center (ARTCC).
Center Operations	*See*, Operations.
CERAP	*See*, Combined En Route Radar Approach Control (CERAP).
Class B Airspaces	Generally, that airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports in terms of IFR operations or passenger enplanements. The configuration of each Class B airspace area is individually tailored and consists of a surface area and two or more layers (some Class B airspace areas resemble upside-down wedding cakes), and is designed to contain all published instrument procedures once an aircraft enters the airspace.
Combined ATCT TRACONs	*See*, Terminal Radar Control Facility (TRACON).
Combined Control Facility (CCF)	An air traffic control facility that provides approach control services for one or more airports as well as en route air traffic control (center control) for a large area of airspace. Some may provide tower services along with approach control and en route services. The U.S. has four CCFs. A list of the 4 CCFs appears in Appendix I.
Combined En Route Radar Approach Control (CERAP)	An air traffic control facility that combines the functions of an ARTCC with a TRACON facility.
Core 30 Airports	The 30 airports with the highest number of operations. A list of the Core 30 Airports appears in Appendix I.
Delays	*See*, OPSNET Delays.
Diversions	Gate return/air return and en route diversion are considered a diversion. However, a planned stop for fuel, known before departure from the gate, where the flight has been dispatched to is not.

Direct User Access Terminal Service (DUATS)	DUATS, or direct user access terminal service is a weather information and flight plan processing service contracted by FAA for use by United States civil pilots and other authorized users. The DUAT Service is a telephone- and Internet-based system which allows the pilot to use a personal computer for access to a Federal Aviation Administration (FAA) database to obtain weather and aeronautical information and to file, amend, and cancel domestic IFR and VFR flight plans.
DUATS	*See*, Direct User Access Terminal Service (DUATS).
EDCT	*See*, Expected Departure Clearance Time (EDCT).
Enhanced Traffic Management System (ETMS)	*See*, Traffic Flow Management System (TFMS).
En Route	Also known as Air Route Traffic Control Center (ARTCC) or, simply, Center. *See*, Air Route Traffic Control Center (ARTCC).
En Route Operations	*See*, Operations.
Expected Departure Clearance Time (EDCT)	The runway release time assigned to an aircraft in a traffic management program. *See also*, Ground Delay Programs (GDP).
FCA	*See*, Flow Constrained Area (FCA).
Flight	The period from the start of the takeoff roll to the first landing.
Flight Service Station (FSS)	A flight service station (FSS) is an air traffic facility that provides information and services to aircraft pilots before, during, and after flights, but unlike air traffic control (ATC), is not responsible for giving instructions or clearances or providing separation.
Flow Constrained Area (FCA)	A defined region of airspace, a time interval, or other characteristic used to identify flights subject to a constraint. This constraint may be due to convective weather, military exercises, or other reasons.
FSS	See, Flight Service Station (FSS).
GDP	*See*, Ground Delay Programs (GDP).
Go Around	A go around (sometimes called overshoot) is an aborted landing of an aircraft that is on final approach.
Ground Delay Programs (GDP)	Ground delay programs are implemented to control air traffic volume to airports where the projected traffic demand is expected to exceed the airport's acceptance rate for a lengthy period of time. Lengthy periods of demand exceeding acceptance rate are normally a result of the airport's acceptance rate being reduced for some reason. The most common reason for a reduction in acceptance rate is adverse weather such as low ceilings and visibility. How it works: Flights that are destined to the affected airport are issued expected departure clearance times (EDCT) at their point of departure. Flights that have been issued EDCTs are not permitted to depart until their expected departure clearance time. These ECDTs are calculated in such a way as to meter the rate that traffic arrives at the affected airport; ensuring that demand is equal to acceptance rate. The length of delays that result from the implementation of a ground delay program depends upon two factors: how much greater than the acceptance rate the original demand was, and for what length of time the original demand was expected to exceed the acceptance rate.

Ground Stops (GS)	Ground stops are implemented for a number of reasons. The most common reasons are: • To control air traffic volume to airports when the projected traffic demand is expected to exceed the airport's acceptance rate for a short period of time. • To temporarily stop traffic allowing for the implementation of a longer-term solution, such as a ground delay program. • The affected airport's acceptance rate has been reduced to zero. How it works: • Flights that are destined to the affected airport are held at their departure point for the duration of the ground stop.
Holdings	Holding (or flying a hold) is a maneuver designed to delay an aircraft already in flight while keeping it within a specified airspace.
IFR Flights	Instrument Flight Rules. A set of rules governing the conduct of flight under instrument meteorological conditions.
Level-Offs	Level-offs are tracked from the top-of-descent (TOD) point or 200 nautical miles (NM) from the airport, whichever is closer. A trajectory segment is considered as a level-off if the change in altitude of position reports is less than or equal to 200 feet and the segment is at least 50 seconds in duration. The metric is calculated as the sum of the count of level-offs for each flight within a scope (i.e. non-military instrument flight rules (IFR) operations arriving into Core 30 airports), divided by the total number of flights within the scope. The metric is derived from flight position reports from the National Offload Program (NOP).
Load Factor	The summation of the number of revenue passenger miles (RPM), divided by the summation of the number of available seat miles (ASM), on revenue paying commercial flights. This quotient is expressed as a percentage. *See also*, available seat miles (ASM) and revenue passenger miles (RPM).
Loss of Separation Events	A defined loss of separation between airborne aircraft occurs whenever specified separation minima in controlled airspace are breached. Minimum separation standards for airspace are specified by air traffic service (ATS) authorities, based on International Civil Aviation Organization (ICAO) standards.
Miles-in-Trail (MIT)	A specified distance between aircraft (in nautical miles), normally, in the same stratum associated with the same destination or route of flight.
National Airspace System (NAS)	The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, and manpower and material. This includes system components jointly shared with the military.
Notices to Airmen (NOTAM)	A NOTAM is a notice containing information essential to personnel concerned with flight operations, but not known far enough in advance to be publicized by other means. It states the abnormal status of a component of the national airspace system (NAS) – not the normal status.
OEP 35 Airports	This is an FAA list of 35 commercial U.S. airports with significant air traffic. These airports serve major metropolitan areas and some also serve as hubs for airline operations. The OEP 35 (Operational Evolution Partnership) is made up of the Core 30, plus five other airports (Cincinnati, Cleveland, Pittsburgh, Portland, and St Louis). In 2005, this list was replaced by the Core 30 list. (Source: System Data and Infrastructure Group, Office of Performance Analysis, Systems Operations Services, Air Traffic Organization, FAA (AJR-G2). https://aspm.faa.gov/aspmhelp/index/OEP_35.html.) (*See*, Appendix I for the list of Core 30 airports and Appendix II for the list of OEP 35 airports.)
Operations	• Airport operations: The number of arrivals and departures from the airport at which the airport traffic control tower is located. • Tower operations: Airport operations, plus airport tower overflights. • TRACON operations: The number of operations passed to and from area airports or centers, including overflights through TRACON airspace. • En route or center operations: The number of operations passing to and from a TRACON to a center, or from one center to another center, or from a center to a TRACON. It includes U.S. overflights and oceanic traffic through center air space that do not arrive at or depart from U.S. territory.

Operational Network (OPSNET)	OPSNET is the official source of national airspace system (NAS) air traffic operations and delay data. This data are used to analyze the performance of the FAA's air traffic control facilities. Reportable delay includes information such as the constrained facility, the reason for delay (weather, equipment, runways, volume, etc.), and the traffic management initiative (TMI) employed in delaying the aircraft.
OPSNET 45 Airports	The FAA list of OPSNET 45 airports appear below. In the late 1990s, these were 45 airports that contributed to 75 percent of NAS delays and had 500 or more operations per day. (Note, by FY2019, the number of OPSNET 45 airports with at least 500 operations per day fell to 36 airports.) (*See*, Appendix II for the list of OPSNET 45 airports.)
OPSNET Delays	Delays to instrument flight rules (IFR) traffic of 15 minutes or more, which result from the ATC system detaining an aircraft at the gate, short of the runway, on the runway, on a taxiway, or in a holding configuration anywhere en route, must be reported. The IFR controlling facility must ensure delay reports are received and entered into OPSNET. These OPSNET delays are caused by the application of initiatives by the traffic flow management (TFM) in response to weather conditions, increased traffic volume, runway conditions, equipment outages, and other causes. Below are descriptions of the categories of delay causes resulting in a reportable delay: • Weather: The presence of adverse weather conditions affecting operations. This includes wind, rain, snow/ice, low cloud ceilings, low visibility, and tornado/ hurricane/thunderstorm. • Volume: Delays must only be reported as volume when the airport is in its optimum configuration and no impacting conditions have been reported when the delays were incurred. • Runway/Taxiway: Reductions in facility capacity due to runway/taxiway closure or configuration changes. • Equipment: An equipment failure or outage causing reduced capacity. • Other: All impacting conditions that are not otherwise attributed to weather, equipment, runway/taxiway, or volume, such as airshow, aircraft emergency, bomb threat, external radio frequency interference, military operations, nonradar procedures, etc. Non-reportable delays are delays incurred by IFR traffic, but which should not be reported in OPSNET.
Overflights	• Terminal overflight: A terminal IFR flight that originates outside the TRACON's/RAPCON's/Radar ATCT's area and passes through the area without landing. • En route overflight: An en route IFR flight that originates outside the ARTCC's area and passes through the area without landing.
Radar Approach Control (RAPCON)	An FAA air traffic control facility using radar and air/ground communications to provide approach control services to aircraft arriving, departing, or transiting the airspace controlled by the facility. Service is provided to both civilian and U.S. Air Force airports. Currently, the U.S. does not operate any RAPCONs.
Radar ATC Facility (RATCF)	An FAA air traffic control facility using radar and air/ground communications to provide approach control services to aircraft arriving, departing, or transiting the airspace controlled by the facility. Service is provided to both civilian and U.S. Navy airports. Currently, the U.S. does not operate any RATCFs.
RAPCON	*See*, Radar Approach Control (RAPCON).
RATCF	*See*, Radar ATC Facility (RATCF).
Revenue Passenger Miles (RPM)	One revenue passenger (fare paying passenger) transported one mile. Revenue passenger miles are computed by summation of the products of the revenue aircraft miles on each interairport segment, multiplied by the number of revenue passengers carried on that segment.
Runway Incursions	A runway incursion is any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and takeoff of aircraft.
Stand-Alone TRACON	*See*, Terminal Radar Control Facility (TRACON).
Terminal Radar Control Facility (TRACON)	An FAA air traffic control facility using radar and air/ground communications to provide approach control services to aircraft arriving, departing, or transiting the airspace controlled by the facility. A TRACON located in an air traffic control tower is an up down or combined TRACON. A TRACON that does not share a facility is a stand-alone TRACON. The U.S. has 147 civilian TRACONs. There are 122 TRACONs in shared facilities and 25 stand-alone TRACONs. A list of the 25 stand-alone TRACONs appears in Appendix I.

Top-of-Descent (TOD)	Top-of-Descent is the transition from the cruise phase of a flight to the descent phase, the point at which the planned descent to final approach altitude is initiated.
Tower Operations	*See*, Operations.
TRACON	*See*, Terminal Radar Control Facility (TRACON).
TRACON Operations	*See*, Operations.
Traffic Flow Management System (TFMS)	TFMS is a data exchange system for supporting the management and monitoring of national air traffic flow. TFMS processes all available data sources such as flight plan messages, flight plan amendment messages, and departure and arrival messages. TFMS is restricted to the subset of flights that fly under instrument flight rules (IFR) and are captured by the FAA's en-route computers. Formerly known as the enhanced traffic management system (ETMS).
VFR	*See*, Visual Flight Rules (VFR).
VFR flights	Flights operated under visual flight rules.
Visual Flight Rules (VFR)	Visual flight rules are rules that govern the procedures for conducting flights under visual conditions. The term "VFR" is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate a type of flight plan.

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David Raymond, FAA

Greg Schaefer, FAA

Kamala Shetty, FAA

Mike J. Sutherland, FAA

Jared Teeter, FAA

JaDa Wells, FAA

Gregory Yuhasz, FAA

For more information, please send inquiries to:

Randal Matsunaga

randal.matsunaga@faa.gov
Economist, System Events and Analysis Group (AJR-G3)
Office of Performance Analysis